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FLIGHT

AIRCRAFT, SPACECRAFT, MISSILES

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Decca and the Future

ON Wednesday of last week the I.C.A.O. meeting in Montreal decided by 20 votes to four, with no fewer than 15 abstentions, to recommend that the use of VOR as a standard short-range navigation aid should be extended until January 1, 1975, and that DMET should accompany it as a new standard until the same date. The British delegation thereupon withdrew Decca. Before it achieves full status as a standard, the decision must be ratified by the I.C.A.O. Council. Airlines, and particularly their pilots, will now probably have to live with the American system for 16 years; but British support for the use and further development of Decca for aircraft will in no way be diminished.

Siding with America for VOR/DMET were Belgium, China, France, Germany, Greece, Spain and Turkey, while Britain, Canada, Australia and New Zealand opposed them. Several smaller nations with no great stake in air transport cast their votes with the U.S.A. Although a group of countries genuinely tried to encourage that objective discussion which the carefully drafted agenda was intended to ensure, the Americans exerted intense pressure and apparently attempted to block any discussion unfavourable to VOR/DMET. The British delegation had on several occasions to refute questionable American technical contentions, particularly about the supposed unreliability of Decca; and the British airlines went so far as to disagree formally with I.A.T.A. statements on this subject. I.F.A.L.P.A., representing 30,000 pilots, strongly opposed VOR and DMET and supported an "area-coverage system with pictorial presentation."

In view of its development potential and its unique low-level coverage, Decca has an assured future, both for ships and for aircraft. A possibility not to be discounted is that Britain might oppose the I.C.A.O. decision by introducing preferential traffic procedures over the U.K. which would virtually force international operators to carry Decca. The step would be perfectly justifiable.

Standing Far Off

A YEAR ago we discussed the feasibility of air-launching anti-missile missiles, alluding to a proposal that this could be effectively achieved by the Avro Arrow (before that mighty aeroplane lay in its open grave while vituperation was volleyed above it). More than once we have expounded the military merits of the stand-off bomb, ordered for R.A.F. Bomber Command as Avro's "Blue Steel"; and in our issue of February 21, 1958, the possibility of launching research vehicles from a Vulcan was discussed by an Avro designer.

Thus the name of Avro has a triple connection with the firing of big bodies from big aeroplanes. Now we have Sir Roy Dobson (who can be quite as devastating as his namesake Zuleika) adding to the tally with a declaration, in the presence of the Deputy Chief of the Air Staff, that even though Avro were in the "missile racket" this was not enough. Missiles, he declared, would need vehicles to carry them, and the company must concentrate on these as well. Nor was Sir Roy referring to the Vulcan, for the vehicle he envisaged would have high-supersonic and VTO capabilities.

Two recent pronouncements add to the Dobsonian piquancy. The first is that the U.S.A.F. is to have a super stand-off bomb—an air-launched ballistic missile (ALBM) called Bold Orion, with a range of over a thousand miles. The second is that our Defence Minister has reaffirmed that the Vulcan will have no successor.

FROM ALL QUARTERS

Flying Start

IN January the aircraft industry achieved its highest-ever total of exports for the first month of a year, amounting to £13,011,002; and this figure brought aviation sales abroad since the war to no less than £800,030,168, of which the sale of engines accounted for £222,594,848 (or 28 per cent).

The previous highest total for January was £11m, achieved last year. The figure for January 1959 was made up as follows: aircraft and parts, £7,568,140 (£6.7m in January 1958); engines, £4,771,211 (the second highest ever achieved, as against £3.9m in January last year); electrical equipment £315,459 (£246,041); aeronautical instruments £263,029 (£127,495); and tyres £93,163 (£46,339). The last three sets of figures show a notable 60 per cent overall increase in sales abroad of electrical equipment, instruments and tyres.

Remembering Robert Blackburn

TO honour the 50th anniversary of the entry into aviation of Robert Blackburn, the founder of the company, a dinner was given at the Dorchester, London, on February 26, by Blackburn and General Aircraft Ltd.

Proposing "The Company and its Founder," Sir Roy Dobson asked, "How shall we replace such men?" He recalled Robert Blackburn's shy and retiring personality; the War of the Roses race of 1913 (organized by the *Yorkshire Evening News*) wherein Avro and Blackburn competed for the first time; and he spoke of his associations with Harry Goodyear and Mark Swann, two of Blackburn's oldest employees. Mark Swann, who was with him at Grain Island during the First World War, had a twin-fuselage Blackburn seaplane; Dobson had the Avro Pike. In Dobson's absence one day the base commander inquired of Swann when the Pike would be ready. Swann replied that he was somethinged if he knew; and on being instructed to go and find Dobson he invited the commander to go and find him his something self. Dobson spent some days restoring tranquillity. Sir Roy also recalled how he himself had been interviewed at Blackburn's Leeds works with a view to taking the post of works manager. He didn't like the look of the job, and Blackburns evidently didn't like the look of him. However, Avro's Sir William Farren and Roy Ewans had both been Blackburn men.

Of the industry generally Sir Roy said that despite gloomy prophecies it was not by any means finished. The Hawker Siddeley Group was built up of small units each with its own autonomy and tradition; so all were efficient. (He had previously recalled how during the First World War Blackburn had been first to institute the system of "daughter firms.") Rationalization, he suggested to the Ministry of Supply, should start at home.

Responding, and proposing "Our Guests," Mr. Eric Turner, chairman and managing director of the Blackburn company, named Sir George Cayley, Robert Blackburn and Sir Roy Dobson as the three greatest Yorkshiremen in the history of aeronautics. Mr. Turner alluded to the "phenomenal success" of Avro Canada under Sir Roy's leadership, and on behalf of the whole assembly wished Sir Roy a speedy solution to that company's troubles.

Mr. Turner had known Robert Blackburn for nine years, and he recalled the wisdom he had learned from him over a glass of "wine." Among apocryphal stories from Blackburn history Mr. Turner related how in 1916 many of the employees at Brough still lived at Leeds, 50 miles away. It was, he said, the practice of the test pilots to travel back to Leeds on a Friday night and engage the workpeople in a game of cards in order to recoup for the kitty as much of the wages as possible. Recalling the engine installation of a certain Blackburn aeroplane Mr. Turner said that a bystander once suggested that the engine should first have been removed from its packing case. He also recalled a torpedo demonstration for a Turkish mission. The mission was greatly impressed with the "full-load" take-off—and equally impressed when they saw two Blackburn employees afterwards walking away with the "torpedo" under their arms!

Having heard that the company had won the NA.39 competition, Mr. Turner said, Robert Blackburn died a happy man. He announced that a day or two previously Mr. Blackburn's widow had donated 10,000 shares in the company to form a Robert Blackburn Memorial Scholarship. There were exciting prospects ahead, said Mr. Turner, and the old company would be there to play its part. He quoted the following pronouncement by a young technician:—

"After man has taught himself to fly at many times the speed of sound, maybe he will expose himself to electronic disintegration, to be transmitted over a co-axial cable and instantaneously reassembled at the other end. But he will still demand safety, reliability and economy in his transportation—and will probably want a gin and tonic on the way."

The First Sea Lord having been stricken with 'flu, Admiral Sir Caspar John, K.C.B., Vice-Chief of Naval Staff, replied. In 1958, he recalled, the Admiralty had itself quietly celebrated a 50-year jubilee: it was in 1908 that their Lordships declared that they could not foresee any possible future for flying machines. Sir Caspar thanked Heaven for the Ministry of Supply, which saw that the Navy got what it deserved rather than what they thought it ought to have. He had warm personal memories of Robert Blackburn. He once asked him why the firm had remained friendly with the Admiralty for such a long time, to which Blackburn replied that he "always enjoyed the impossible." The NA.39 Sir Caspar described as "the latest challenge to the Navy's ingenuity." The Navy of the future would be modest in size but unsurpassed in versatility.

Britain Opposes VOR/DMET

BY the time these words appear, Mr. Harold Watkinson, Minister of Transport and Civil Aviation, should have made a statement in Parliament concerning the I.C.A.O. divisional decision to support VOR/DMET as a standard until January 1, 1975. The head of the British delegation at the meeting was recalled from Montreal last week-end for consultations and the M.T.C.A. has stated that "the choice between the new systems [VOR/DMET and Decca] was not, in the view of the United Kingdom representatives, being taken for objective, technical reasons and they considered that the Decca system was not being judged on its merits. The delegation therefore withdrew Decca from the voting and reserved the position of the U.K." Canada followed suit, but added that neither aid would meet international needs.

Amongst delegations who voted on the American side were those from the Argentine, Belgium, Brazil, France, Germany, Greece, Spain, Turkey and, it is understood, the Netherlands. To these were added the votes of Bolivia, Chile, Nationalist China,

AT THE BLACKBURN DINNER (see news item "Remembering Robert Blackburn" on this page) are, l. to r.: Mr. Eric Turner, the company's chairman, greeting Sir Frederick Brundrett, Scientific Adviser to the Ministry of Defence; Air Marshal Sir John Whitley, Air Member for Personnel, with Air Marshal Sir Hubert Patch, Air Member for Personnel designate (left) and Marshal of the R.A.F. Sir William Dickson, Chief of the Defence Staff; Admiral Sir Peter Reid, Controller of the Navy (left) with Mr. L. J. Dunnett, Permanent Secretary to the M.T.C.A., and Air Chief Marshal Sir Claude Pelly, Controller of Aircraft, M.o.S.

THREE GENERATIONS of Avro aircraft are represented in this recent picture of a Vulcan, a Lincoln and a 504K. Equivalent horse-powers (approximate): 100,000; 7,000; 110

Colombia, Ecuador, South Korea, Nicaragua, Peru, the Philippines and Thailand, none of whom can be said to have any sizeable stake in air transport. They certainly have no high-density air traffic. Among the 15 who abstained, Poland, Czechoslovakia and the United Arab Republic could not be expected to vote for either system, while Denmark, Ireland, Norway, Sweden and Switzerland took a moderate line at the meeting and appear to have remained unconvinced in either direction. Unexpected abstentions were those of Italy, Japan, Mexico and Venezuela, who might have supported America.

Some definite counter-move appears inevitable, particularly in view of two recent instances in which "buy-American" policy has been or is being applied to prevent British exports to America. One form of opposition is mentioned in our leading article this week. Other steps, within or outside I.C.A.O., can certainly be expected.

Ejection Francaise

IN conjunction with the Martin-Baker Aircraft Co. Ltd., the Société d'Exploitation des Matériels Hispano-Suiza has founded a French company—Société d'Exploitation des Matériels Martin-Baker—to produce Martin-Baker ejector seats in France under licence. The head office will be at 26 Rue de Villiers, Levallois-Perret, and the seats are to be constructed in the Hispano-Suiza factory at Bois-Colombes. Its first products have been ordered for the Dassault Mirage III.

Three Losses to Aviation

WE greatly regret to record the deaths last week—in this country and in America—of three men well known in aeronautical circles. In each case death occurred at a comparatively early age.

Fred Rowarth, F.R.Ae.S., passed away last Friday at the age of 59 after a short illness. He will be chiefly and affectionately remembered by sporting pilots as an R.Ae.C. official—he was a Club handicapper for 25 years, from 1928 to 1953—but in latter years also became known as a prominent member of the industry. He was executive director and general sales manager of Automotive Products Co. Ltd., Borg & Beck Co. Ltd, Lockheed Hydraulic Brake Co. Ltd. and Lockheed Precision Products.

Educated at Christ's Hospital, he held various Government aeronautical technical posts in the inter-war years, and was chief engineer of the A. and A.E.E. from 1936 to 1942. During the next three years he was Deputy Director of Installation Research. He joined Automotive Products in 1945 as general sales manager and was appointed an executive director in January 1946.

Mr. Rowarth leaves a widow and two sons.

* * *

Alfred Richard Oscar Weyl, A.F.R.Ae.S., A.F.I.A.S., F.B.I.S., died on February 23. Born in Berlin 61 years ago, he came to this country in 1935 and acquired British nationality. In Germany he had held a number of responsible technical posts following active service in the Royal Prussian Air Corps in the First World War. He was a senior staff officer in the D.V.L. (Research Institute for Aeronautics) and was subsequently principal assistant to the professor of the aeronautical engineering department at Berlin university. At other periods he was in charge of special projects and did a considerable amount of test flying of prototypes.

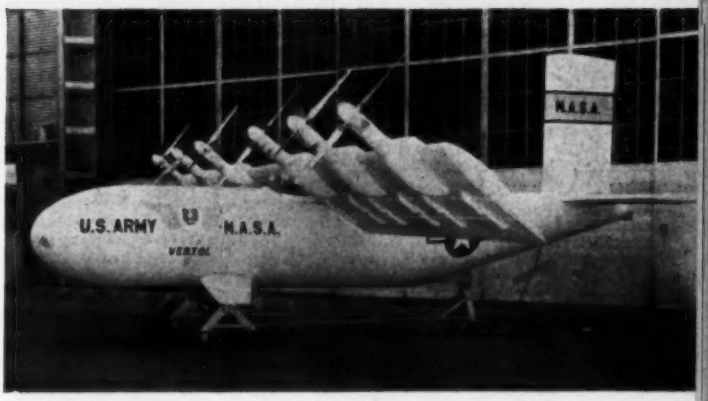
After the war he turned to design work and was responsible for a light sporting monoplane built by Udet-Flugzeugbau at Munich (later the Messerschmitt works). Soon after coming to England he founded the firm of Zander & Weyl in partnership with E. P. Zander. Later, as Dart Aircraft Ltd., the company produced the ultra-light Dart Kitten, two examples of which are still flying.

Alfred Weyl was also an authority on armament (on which subject he contributed some important articles to *Flight*) and self-sealing fuel tanks, and his researches included tailless aircraft development, guided-missile design and aircraft plastics technology. A man of original and inventive turn of mind, he was extremely forthright in his opinions and his impatience with official policies on occasions brought repercussions which would have subdued a less fiery spirit. Mr. Weyl leaves a widow and a son.

* * *

Robert B. C. Noorduyn, designer of the Noorduyn Norseman and other aircraft, died early last week at Burlington, Vermont, at the age of 66.

Mr. Noorduyn was by birth a Dutchman and went to the U.S. in 1920 as an official of the Fokker Aircraft Corporation. From 1932 to 1934 he was with Pitcairn Aircraft Inc., designing a four-seat autogyro which was a forerunner of the helicopter. He designed the Norseman while he lived in Montreal (from 1934 to 1939), where he founded his own company, Noorduyn Aviation Ltd. He retired in 1946 but returned to business six years ago to establish Noorduyn Norseman Aircraft Ltd., with headquarters in Montreal.



WIND TUNNEL MODEL of a projected Vertol six-turboprop tilt-wing transport. The model has a span of 35ft and weighs about 14,000 lb. Propulsion is by a 1,000-h.p. variable-frequency electric motor

The Dowty-Rotol Deal

FOLLOWING the Dowty Group's acquisition of Rotol Ltd. (*Flight*, December 26, 1958) the Group last week issued a statement to its shareholders setting out the advantages. An important consideration, it says, is the combining of two undertakings developing and manufacturing similar and, in some cases, identical products in factories only two miles apart. Rotol are self-sufficient in their production facilities, whereas Dowty subcontract much of their work; they will now be able to use the capacity of Rotol's large and well-equipped factory. Dowty have also gained a first-class team of technicians well versed in the design and development of hydraulic equipment. This team, combined with their own, may well constitute the largest and strongest team of hydraulic engineers in the country. The Group's total payroll has increased to ten thousand.

The purchase price of Rotol's share capital was £2,235,000 and a further £1,265,000 was required to repay loans to Rotol from Rolls-Royce and Bristol. [These two companies, the previous joint owners of Rotol, have said that they will continue their commercial relationship with that company.] Of the total of £3,500,000 that is therefore needed to be found, £3,425,000 is being financed by a rights issue to Dowty shareholders of two new 10s Ordinary shares at 36s 6d each for every five existing shares held on February 13 last, fractions being disregarded. The remaining £75,000 and all costs of the issue and underwriting expenses are being met from the Group's own resources.

The accountants' report on Rotol's financial position is based on figures for the year ended December 31, 1957, and shows the book value of net tangible assets (before deducting £322,710 for future taxation) at £3,239,810. Profits before taxation for 1955, 1956 and 1957 were £527,254, £442,266 and £601,583 respectively. Although final figures for 1958 are not yet available, adds the Dowty Group, the profit is estimated at £735,000.

HERCULEAN BLOW: Lockheed Georgia Division are working on a boundary-layer control system to confer short-field performance on the big C-130 military transport. These two diagrams, issued by the company, show broad details of the installation. Independently of the C-130's four Allison T56 turboprops, it is stated, "two turbojet engines will blow air over the ailerons, flaps, rudder and elevators"

FROM ALL QUARTERS . . .

Inertial System from Smiths?

AN advertisement for design staff indicates that another British company is entering the inertial navigation field. Design personnel are being sought by Smiths Aviation Division—at the Bishop's Cleeve, near Cheltenham, factory of S. Smith and Sons (England), Ltd.—for work "on major projects in the field of inertial navigation and associated systems." Sections of the project include stabilized platforms, electronic computing devices, transistorized convertors and stabilized power supplies, miniature servo systems and related test equipment.

Saunders-Roe Test Pilot Appointed

APPOINTED chief test pilot (fixed-wing aircraft) of Saunders-Roe Ltd. is Lt-Cdr. P. M. Lamb, D.S.C., A.F.C. With 3,000 hours' experience (including 700 deck landings) on 75 aircraft types, he has had a distinguished career since he joined the Fleet Air Arm in 1941. He gained his D.S.C. in the Korean operation in 1950, and a Bar to that award at Suez in 1956; the A.F.C. followed his work with the Naval Test Squadron at Boscombe Down. Lt-Cdr. Lamb's commands have included those of No. 810 Sqn (1955-57) and No. 700 (1957-58).

Lt-Cdr. Lamb

IN BRIEF

A five-day meeting on *Interference Effects in Aerodynamic Test Facilities* was due to be held this week at the NATO Training Center for Experimental Aerodynamics at Rhode-Saint-Genese, Belgium, under the sponsorship of the AGARD Wind Tunnel Panel.

* * *

Mr. Gwyn H. Robinson has been appointed manager of customer relations for Northrop International, a division of Northrop Corporation. He has been assistant to the division's vice-president and general manager, Mr. J. Gilbert Nettleton, Jr., for the past year.

* * *

Among current issues of Iliffe journals are the following special numbers certain to be of value to readers with interests in the particular activities concerned: *Amateur Photographer* for March 4—Outdoor Number; *The Motor Cycle* for March 5—Spring Number and Buyers' Guide (containing the first of three sections of a free 100-page practical handbook on maintenance, tuning and repair); *Yachting World* for March—annual Fitting-out Number.

* * *

The first issue of a quarterly bulletin, *Agricultural Aviation*, was recently published by the European Agricultural Aviation Centre, le v.d. Boschstraat 4, The Hague. Established in July 1958 under the auspices of the Organization for European Economic Co-operation (European Productivity Agency), the centre has as its object to promote the use of aircraft in the agriculture, horticulture and forestry of European countries and to contribute to an increase in agricultural productivity. The first issue of the bulletin, which is published in English and French editions, contains articles on potato-spraying in the United Kingdom and forest spraying in Germany, descriptions of agricultural aircraft and equipment, and extracts from recent literature on the subject. Annual subscription in this country is £1 4s.

ELECTRICAL SYSTEMS AND BRITISH AIRCRAFT

AT a luncheon in London on February 26, Lord Caldecote, deputy managing director of English Electric Aviation Ltd., spoke of some of the factors which had influenced the investment of £2,000,000 in the Aircraft Equipment Division at Bradford. In the past four years, he said, the work of the Division had been considerably expanded and the equipment of English Electric manufacture was now used on 17 types of British aircraft.

Nevertheless, they had to come to terms with the hard fact that among airlines and some of the British manufacturers of civil aircraft there was now some preference for American electrical equipment. "This," said Lord Caldecote, "is a formidable attitude and one which we naturally regret, but we are nevertheless confident of being able to deal with it. Proven reliability of electrical equipment is of paramount importance to the aircraft constructor, and when there is available an advanced U.S. system—already proven by many years of flying, often in military aircraft—he is sorely tempted to adopt it."

In answer to questions, Lord Caldecote agreed that the ancillary industry was having to live down the prejudice established by equipment supplied four or five years ago. English Electric believed that their substantial test and development installations at Bradford, where complete systems could be proved —£500,000 had been spent on setting up system laboratories— were a positive step in this direction, but they appreciated that it was flying hours more than sheer scientific excellence that most impressed the aircraft manufacturer and his customer. In consequence they had negotiated technical exchange agreements with Jack and Heintz and were building under licence the Sundstrand constant-speed drive. The military version of this drive, supplied by English Electric for the Victor Mk 2 and Vulcan Mk 2, had been run for over 12,000 hr, including some flight testing.

A radical change in defence policy, Lord Caldecote suggested, could result in orders for new military aircraft being placed early enough and in sufficient quantity to provide flight development opportunities for systems eventually intended for civil aircraft. As a converse example, cancellation of the Avro 730 supersonic bomber had greatly increased difficulties for proving systems for a supersonic transport.

Following Lord Caldecote's remarks there was considerable discussion on the ways in which the deadlock on British systems-development could be broken if the process is continued of building under licence from a competitor. Sweeping changes in defence policy seem unlikely, and an alternative course, *Flight* suggests, is for new British systems of great technical merit to be developed by their manufacturers sufficiently in advance of new British (or foreign) aircraft for proven articles to be offered when equipment decisions are made. To provide the necessary flight experience, a liberal attitude to development would be required on the part of the M.o.S., the Corporations and possibly the independent airlines. Experience in commercial use provides the best chance of quickly accumulating flying hours.

If British component- and systems-design effort is not to atrophy under pressure of competition from abroad, there seems to be a good case to be made for Government assistance—at least with flight development. It is clear that sufficient experience must be bought if British accessory system manufacturers are to sell their equipment to British aircraft manufacturers or to anyone else. If it is not, there is a danger—as English Electric recognize —that all systems might as well be obtained direct from abroad. But perhaps this is an unduly pessimistic view. As Lord Caldecote said, "We believe that when the final designs for the next round of British civil and military aircraft are completed they will have much British equipment, including our electrical systems, and that we shall have proved to British designers that our electrics are as good as anything available in the U.S."

English Electric have given some details of the paralleled constant-frequency A.C. system used in the Handley Page Victor Mk 2. Weight-saving with this system can, it is claimed, amount to as much as 10 lb/kW. Electrical power is provided by English Electric eight-pole A.C. generators rotated by the licence-built Sundstrand drive. A frequency- and load-controller keeps alternator frequency substantially constant by monitoring the setting of the basic drive governor and equalizing real load distribution between machines operating in parallel; and a carbon-pile voltage regulator maintains the busbar voltage constant to within plus or minus 2½ per cent.

THE DEFENCE DEBATE

Rockets and Aircraft: Swallow and Malkara: An Air-transportable Tank

IN the House of Commons on February 25 Mr. Duncan Sandys, the Minister of Defence, moved approval of the progress so far made with the Government's Five-Year Defence Plan. For purpose of comparison, he said, the House might be interested to know that the carrying capacity of the R.A.F. was today about equal to that of B.E.A. The 20 Britannias which would begin to come into service in April would add half as much again. Argosies and the Britannics would add another 50 per cent on top of that. When the present programme was completed the carrying capacity of the Air Force would be over four times larger than it was in 1951.

Public interest had centred on two main aspects of the British ballistic rocket—the cost, and the type to be chosen. Continued Mr. Sandys: "Rockets—particularly long-range guided rockets with nuclear warheads—are, of course, expensive things. But the rocket is not a superfluous addition to our armoury. We must remember that the rôle of the ballistic rocket is to take the place of the V-bomber when it comes to the end of its operational life. If we did not make the rocket, we should have to develop and manufacture another generation of strategic bombers and provide the trained crews, airfields and control systems to operate them. The cost of developing and manufacturing the rocket will, as far as I can estimate, be roughly of the same order of magnitude as the cost of developing and manufacturing another generation of strategic bombers. Of course, the cost of maintaining and operating the rockets, once they are installed, would certainly be considerably lower than the cost of running a bomber force. It follows that if we can afford a bomber deterrent now, we should be able to afford a rocket deterrent in the future."

If we could afford to have an assortment of deterrents we should certainly like to have a proportion of Polaris and Minuteman missiles. In making the choice of Blue Streak a wide variety of operational factors had been considered—thrust, range, vulnerability, size of warhead, spare carrying capacity for various future developments, and date of delivery. In the present state of knowledge, Mr. Sandys was confident, our decision to continue with the development of Blue Streak was the right course. Any other course would involve a wholly unjustifiable gamble.

Of British sites for Thor, the Minister said that we were giving £10 million and the Americans were paying a large sum in developing the weapon. The progress that had been made in the development of Thor in such an exceedingly short time was very remarkable.

Britannic Question

Sir Arthur Vere Harvey (Con., Macclesfield) said that he was very disappointed with the statement made the previous week regarding the Britannic freighter for which the Government were now about to place an order. He had nothing against the Britannic and he thought that if we could have it within two years it would be a very useful aeroplane; but the previous day the Minister of Supply had said that it was selected because it had good commercial prospects. He would like to know who told him that it had good commercial prospects, other than the builders. Had B.E.A. or B.O.A.C. told him, or any other airlines? We were already in the position in which airlines like B.E.A. were discarding the turboprop aircraft and going in for the pure jet. All airlines were thinking that way. This freighter would probably not arrive for another five or six years and then it had to last another eight or ten years, as the Hastings had done, which meant that we should be saddled with the aircraft for fifteen years. Today, a freighter might not be a great thing in world commerce but in the years to come it would be. The cost of buying a pure-jet aircraft as opposed to a turboprop aircraft was not very different, but 250 miles difference in speed was a bonus which would mean money and profits to airlines.

When the debate was resumed on February 26 the Minister of Supply, Mr. Aubrey Jones, said that his Ministry was developing a much lighter tank, which he hoped would be air-transportable. Trials were now being conducted with the Australian anti-tank weapon Malkara. "By and large," said Mr. Jones, "we feel that the Malkara is more powerful than the French weapon [SS.10/SS.11]. The Malkara is a child of Anglo-Australian parentage in that it is the outcome in the long-term of the Australian rocket range at Woomera. It was the establishment of that range which introduced Australia to guided weapons and inspired the Australians to develop a guided weapon of their own. We have not finally decided to adopt that weapon, but the preliminary trials are being singularly successful and I congratulate the Australians on a most remarkable achievement."

Mr. Jones said later in the debate that the R.A.F. was a deterrent force, but not exclusively: it had a conventional rôle, too. "I think," said Mr. Jones, "that those who have contended that there is insufficient preparation for a limited war have ignored the change of balance between these two rôles of the R.A.F. The White Paper for 1957 has been criticized repeatedly in this debate for laying too much emphasis on the deterrent; but look at the deletions from it. The projects which that White Paper deleted from the research and development programme were all, in fact, deterrent projects. They were the supersonic bomber and the supersonic fighter, which were intended to defend the deterrent bases in this country. The new aircraft, the TSR.2, is not a deterrent weapon. It is not a bomber in the conventional sense of the word, but an aircraft intended to give strike support to ground forces in Europe and overseas."

In the TSR.2, for the first time in the history of the R.A.F., we had an aircraft designed from the beginning to make use of rudimentary airfields overseas; in other words, to cope with limited war. The reason for the delay in deciding on the TSR.2 was the redesigning of the aircraft to make it suitable for limited war contingencies overseas. Exactly the same was true of the Swallow aircraft, which was cancelled in 1957 because it was related to the supersonic bomber. It was a post-supersonic bomber. Mr. Jones added, "The case for having it in the research programme now is that we shall have to study its applicability to the strike rôle, whether that rôle be performed by the R.A.F. or the Navy."

Mr. Jones later said that there was no ground at all for assuming that a solid-fuel missile would be cheaper than a liquid-fuel missile. "They have in the U.S.A.," he said, "Thor and Jupiter, single-stage missiles of very limited range. Beyond that, there is the multi-stage missile of much greater range. What the Americans have not got is a single-stage missile, intermediate between those two ranges, and that is what Blue Streak is. It is not a duplication. It is, once again, a reinforcement. It is pertinent to remind hon. Members of the history of American intermediate range ballistic missiles. Thor and Jupiter were developed by the Americans specifically for use on the European continent. They have a limited life. They must one day have a successor, and the Americans have indicated that they do not propose themselves to develop a successor. They look to us or to the European continent. The most practical way of developing a successor for the European continent is, therefore, our effort, Blue Streak, on which we have invited and invite European co-operation. I do not see how we can lightly turn round to the United States and say, 'No, we have not the talents, nor the skills, nor the resources to do this.' "

Mr. Sandys said towards the close of the debate, "The Polaris rocket is propelled by solid fuel and, owing to restrictions of space in a submarine, its size must be kept down as much as possible. That, of course, limits its range and the weight and capacity of its warhead. Since a smaller warhead has a smaller explosive yield, more rockets are needed to pose an equivalent threat. The weight-carrying capacity is also of great importance.

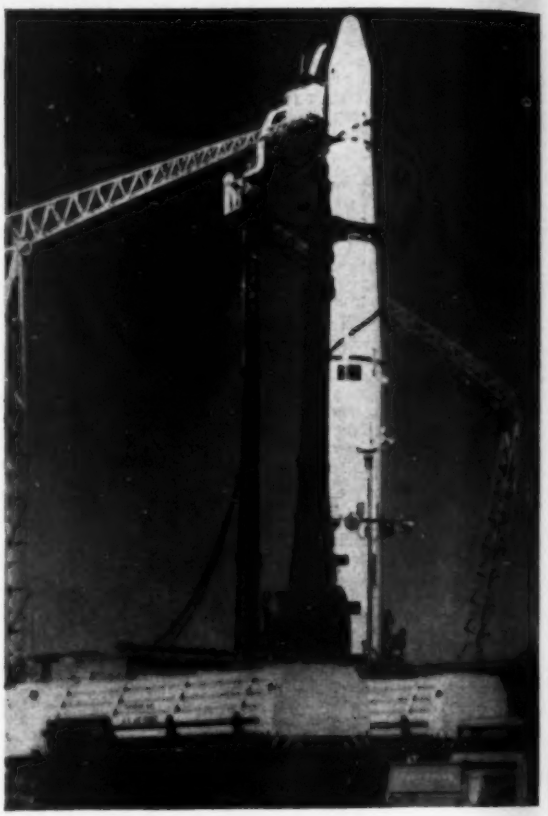
"We and the Americans are working hard on the problem of anti-missile missiles, and I have no doubt that other countries are doing the same. To counter this development the missile will have to be provided with the means of evading or foxing the anti-missile missile which is coming up to destroy it. These devices and decoys in the rocket may require quite a lot of space and may be fairly heavy. If, therefore, we wish our rocket to remain an effective deterrent for a reasonable time, it should possess a margin of additional power and payload to accommodate these future developments. The Blue Streak, with its powerful thrust and large capacity, will, we believe, provide this margin, and sited underground it will be very difficult to knock out."

RETROSPECT

From "Flight" of March 6, 1909

Fashions for Flyers: Ever keeping pace with the times, the editor of the *Tailor and Cutter* has, of course, not lost sight of the effect which the recent advances in flight may have upon the sartorial art, and so he recently organized a "sky wear competition." One of the entrants, with an eye for the useful as against the merely ornamental, sent in a design for a safety suit. At first glance this would appear to be an ordinary "Norfolk" costume, but when the flyer finds himself in the dangerous position of being suddenly precipitated to earth he undoes the jacket, rolls up his sweater, and, lo! there drops down a garment reminding one of the *parapluies* which were so fashionable among motorists a few years ago. The aeronaut then lets go of his airship or aeroplane, and the "skirt" of the garment spreading out like a parachute, he gradually floats to earth. These operations are said to occupy three seconds.

Missiles and Spaceflight



A Thor first stage and a Lockheed second stage using a Bell Hustler rocket formed the launching vehicle, seen here at Vandenberg A.F.B., for the first Discoverer satellite firing, reported below

FIRST DISCOVERER

The launching of the first Project Discoverer satellite took place at Vandenberg A.F.B., California, on Saturday, February 28. Data from the satellite was telemetred back to base during the first ten minutes after firing, and the vehicle was adjudged to have "reached the right point at the right speed where it should have gone into orbit," but there was no further radio contact.

First stage of the launching vehicle was a standard Thor IRBM. The second stage, which was intended to enter orbit together with the 40 lb payload of scientific instruments, was of Lockheed design and incorporated a Bell Hustler rocket motor. The firing was the first satellite launch to be made from the U.S. West Coast, and was intended to result in a low-level, polar orbit.

U.S. SPACE PROBE

A four-stage Juno 2 space probe was launched from Cape Canaveral at 0511 hr G.M.T. on Tuesday, March 3. Its 13-lb payload was expected to pass within 35,000 miles of the Moon some 34 hours after launch, and to continue into a solar orbit. Early reports stated that the probe was slightly off course, but had an extra margin of speed.

BRITISH SPACE COMMITTEE

The first meeting of the newly formed British National Committee on Space Research was due to be held on Wednesday, March 4 in the rooms of the Royal Society, London. The committee was set up to co-ordinate British research activities in upper-atmosphere research and to co-operate in the international field, and its chairman is Prof. H. S. W. Massey, F.R.S.

HAWK IN THE HOUSE

In the House of Commons on February 23, Mr. Geoffrey de Freitas asked the Minister of Supply whether he was satisfied that full consideration had been given to the merits of the Bloodhound and the Thunderbird before the U.S. Hawk missile was ordered by NATO. Full information was given, Mr. Aubrey Jones replied.

In a further question Mr. de Freitas suggested that the U.S. Government gave "far greater backing" to American aircraft salesmanship than the British Government did. In reply the Minister said that he acknowledged that it was the duty of the M.o.S. to do everything it could to bring employment to our aircraft industry. He thought the two British weapons offered considerable advantages over the Hawk, "but it must be recalled that the Americans offer considerable capital sums and our resources do not permit us to offer capital sums to quite the same extent."

Answering other questions on the same day, Mr. Jones said that results achieved to date in this country on research into the infrared detection of ballistic missiles "compare extremely well with those achieved elsewhere." He emphasized that the work being done was research into basic techniques.

CANADIAN ROCKET

The successful static firing of the largest rocket engine yet produced in Canada took place at the Canadian Armament Research and Development Establishment at Valcartier, Quebec, on February 23. Almost a ton of solid propellant developed by C.A.R.D.E. was employed, and a thrust of approximately 20,000 lb was produced for a period of about 20 sec. The rocket, 17ft long and 17in in diameter, was tested as part of a general programme for the development of improved solid-propellants to power research rockets. The Canadian Defence Research Board, announcing the firing, said that some 50 smaller (8in) rockets had been statically tested in the past year. A complete rocket vehicle employing the larger motor would be flight-tested later this year.

SIDEWINDER FOR SWEDEN

The U.S. Sidewinder air-to-air missile has been ordered as standard armament for fighter aircraft of the Royal Swedish Air Force, including the Saab-35 Draken and the Saab 32-B Lansen. The order follows investigations by the Swedish Air Force and by Saab. The Draken installation comprises a total of four Sidewinders, two beneath the fuselage and one under each wing.

CHEAP ROCKET

Details were recently disclosed by the U.S. National Aeronautics and Space Administration of a planned new satellite-launching rocket which should cost approximately one-fifth as much as current rockets of comparable performance. Known officially as the Scout and unofficially as the poor man's rocket, it should cost less than $0.5 million. Of four-stage solid-fuel design, and with a length of some 70ft, the Scout will probably be ready by spring 1960 to place a 150 lb satellite in orbit.

AT CAPE CANAVERAL

Recent ballistic missile launches from Cape Canaveral, Florida, included that of a Titan ICBM on February 25 and of a Jupiter IRBM on February 27. The Titan, with second-stage fuel tanks containing some 5,000 gal of water as ballast, was aimed at an impact point some 300 miles from the launch point along the Atlantic missile range.

ATTEMPT AT ENTIRETY

Presented as "a new vista of the entirety from which emerges the unidentified flying object," a recent U.S. book* by W. Gordon Allen is nothing if not ambitious. The author offers "a possible semi-solution of the apparent multi-dimensional problem that becomes ours when we venture into the intellectual realm of space travel," and goes on to link Einstein, Newton, Swedenborg, atomic theories, UFO sightings, a British "thought resonator," and reported visits by beings from Mars and Venus, with the author's new force-field vista of the entirety.

This vista involves a four-field continuum constantly moving through n dimensions, the four fields being electromagnetic, electrostatic, life force, and "Intelligence or Universal or Cosmic Mind all-pervading intelligence."

Mr. Allen is convinced that conventional science has suppressed a realization that the mind of man seems to be a many-levelled receiver that tunes to the universal thought source, and he includes as appendices to his book four essays by Carl Frederick Krafft intended to disprove the nuclear theory of atomic structure in favour of the vortex atom theory. Our own reaction to the book is to agree all the way with Mr. Allen when he says, on page 102, "We are extremely inadequate to understand an existence of the ultra-dimensional non-existent."

K. T. O.

*"*Spacecraft from Beyond Three Dimensions,*" by W. Gordon Allen. Exposition Press, New York, $3.50. Illustrated.*

Missiles and Spaceflight . . .

MISSILE-AGE PRODUCTION

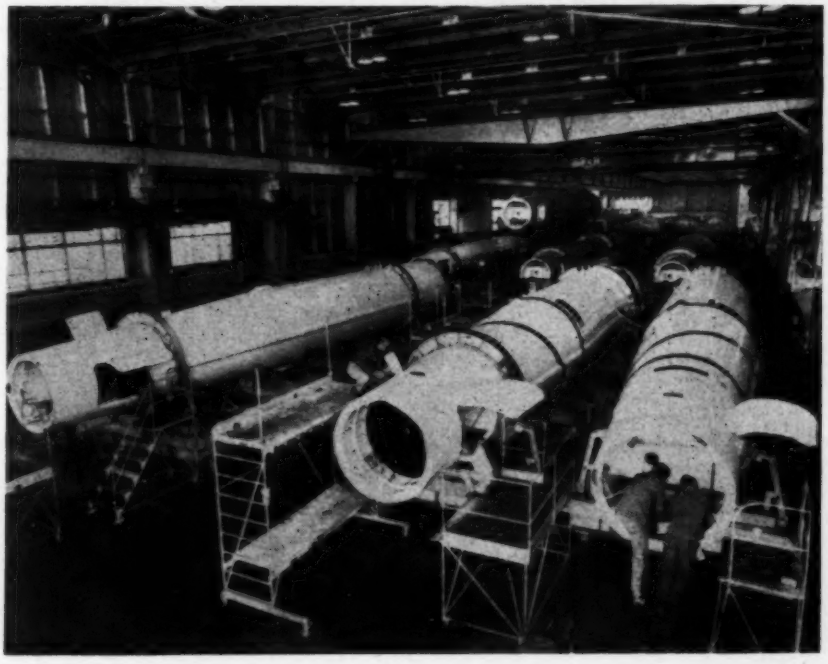
THE pictures on this and the following page are the first to be released showing intermediate-range and intercontinental missiles in volume production in America. The considerable variations in structural characteristics—and therefore of production and fabrication methods—can be appreciated, particularly between the Thor being produced at Douglas Santa Monica and the Atlas at Convair Astronautics. None of the pictures, however, provides much information on the considerable backing of large machine tools and special jigs required in the production of the more advanced structures employed in weapons such as Jupiter and Atlas.

Because Atlas was placed on a "crash" basis at a very early stage, in 1954, the engineering design and tooling production stages were substantially telescoped. Besides effecting a time-saving of many months in comparison with the conventional procedure, this has allowed the tool-designers to sit in on the earliest design-stages in order to monitor progress and make detailed estimates of new equipment and techniques long before release of the final drawings. In terms of missiles produced, the

(Top left) At least a dozen Atlas airframes, including some for production rounds, mounted in elevated frames for testing. Equipment is in trenches beneath each missile. The boost sections at upper left have been withdrawn to allow simultaneous installation of all three engines. Atlas are sent from here to static-firing sites at Sycamore Canyon and Edwards A.F.B., and to flight-test at Vandenberg A.F.B. or Patrick A.F.B. (Cape Canaveral, Florida)

(Top right) Jupiter boost assembly set up in a pit for equipment testing. In the background are some of the heavy presses and other machinery used for fabrication. Chrysler are responsible for production

(Right) Thor in production at Douglas' Santa Monica plant. The warhead is mounted in the nearer end of the airframe and components of the A.C. Spark Plug inertial-guidance system are being installed in the left-hand airframe. Retro-rockets to prevent the missile overtaking the nose-cone after separation are covered by the small bulges visible above and below the body where the tapered section begins



Missiles and Spaceflight . . .

(Right) Parallel assembly of Jupiters on the left and Redstones on the right at the U.S. Army Michigan Missile Plant at Detroit, operated by Chrysler

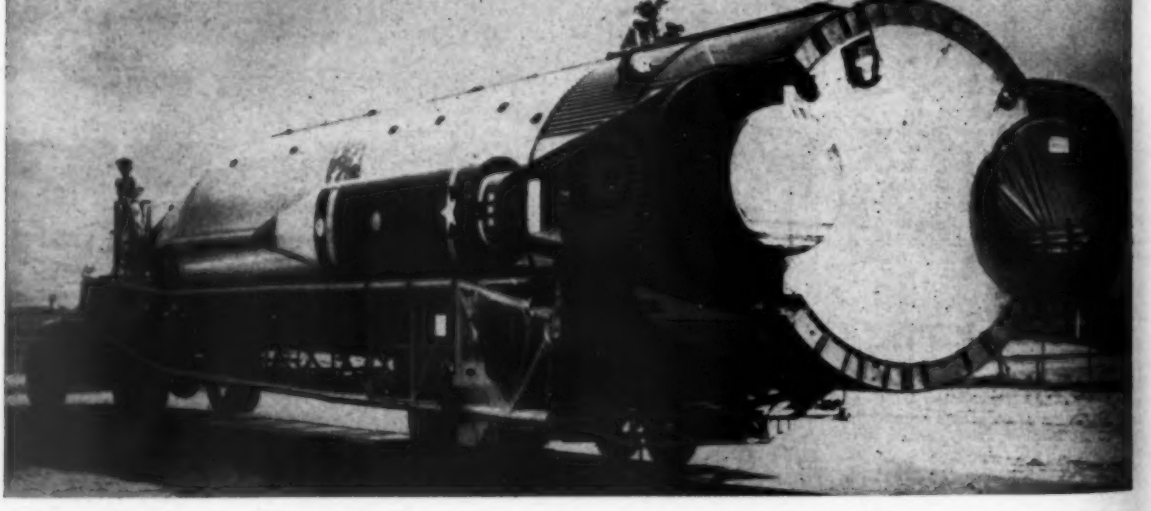
(Below) Rocketdyne MB-3 motors, some installed in their power packages, await assembly to Thor airframes at Douglas Santa Monica

production runs are relatively small; and modifications and new methods have to be incorporated in production weapons almost immediately they become available. A permanent staff of production engineers assigned to the various design departments has greatly facilitated such changes.

The Thor airframe is a relatively conventional assembly of stressed skin or integrally stiffened skin panels, but Atlas is based on butt-welded steel panels measuring 3ft wide by 6ft long and 0.01in thick, stretch-formed at −90 deg F and butt-welded. Completely new machinery and techniques have been developed and special control tools have been applied to ensure dimensional accuracy of the assemblies in order to achieve the required interchangeability. Convair state that automatic control of machines is a necessity in such procedures and that the manpower employed is considerably less than for conventional airframes of similar size.

The U.S. Army's Jupiter, which is to remain in production for a further year by the Chrysler Corporation, equally involves the use of extensive and complex jigs in which large curved panels may be automatically aligned and welded.

An 80ft-long Atlas, bearing the U.S.A.F. emblem and the star-spangled band of S.A.C., being moved at Vandenberg A.F.B., California. Only the two booster motors are in position. A look-out is posted forward and the rear bogie is steered by a man sitting within the girder framework at the rear



Comets for Argentina

How Aerolineas Argentinas Plan to Use Their New Fleet

By
M. J. HARDY

ALTHOUGH Argentina's "chosen instrument" airline is ten years old this May, their de Havilland Comet 4 (the first of six) which was due to be delivered at Buenos Aires on March 2, is the first aircraft actually to be ordered by the airline since its formation. This apparent anomaly is explained by the fact that Aerolineas Argentinas was formed on May 14, 1949, by the merger of four existing companies, which between them had ordered the aircraft that make up the present fleet. These were FAMA (Flota Aerea Mercante Argentina), ALFA (Sociedad Mixta Aviacion del Litoral Fluvial Argentino), ZONDA (Zonas Este y Norte de Aerolineas Argentinas) and Compania Aeroposta Argentina, S.A. The newly formed airline was given a monopoly of all external and most internal services, and until recently its only competitor on internal routes was LADE (Lineas Aereas del Estado)—a branch of the Argentine Air Force which began operations in September 1940 and which operates domestic services, especially to isolated areas of the country where the traffic is insufficient to permit economic operation on a commercial basis.

It is no secret that Aerolineas Argentinas have lost money in the past, but the airline's president, A. Cdre. Juan José Güiraldes, recently had an interview with Dr. Frondizi, President of Argentina, in which he discussed the airline's achievements, problems and future prospects. Aerolineas aims to achieve economic self-sufficiency in the coming financial year (1960-61) as the first step in its plans for expansion. Questioned by the Press after his interview with the President, A. Cdre. Güiraldes revealed something of his airline's plans for acquiring new equipment for domestic and regional services: for the former, the Friendship and one of the turboprop versions of the Convair 440 were being considered, while for the regional routes to neighbouring South American states the Caravelle was being studied.

Airline	Equipment	Return Services Weekly	European Terminal
Aerolineas	DC-6	one	London
Aerolineas	DC-6	one	Frankfurt
Air France	L-1049	two	Paris
Alitalia	DC-6B	two	Rome
Iberia	L-1049G	one	Madrid
K.L.M.	DC-7C	two	Amsterdam
Lufthansa	L-1049G	two	Hamburg
Panair	DC-7C	one	London
Panair	DC-7C, and L-049	one	Beirut
Panair	DC-7C, and L-049	two	Frankfurt
S.A.S.	DC-7C	one	Stockholm
S.A.S.	DC-7C	one	Copenhagen
Swissair	DC-7C	one	Zurich

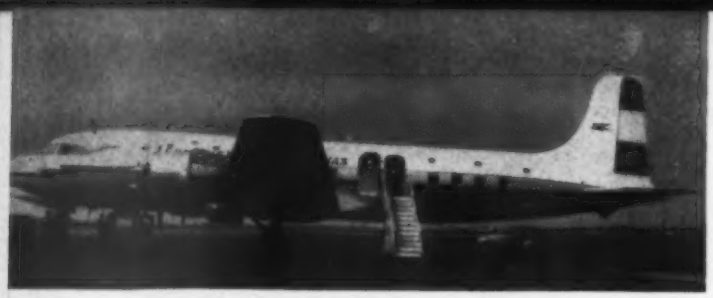
Aerolineas have, in fact, since placed an order for ten Fairchild F.27 Friendships with an option on ten more, and deliveries will begin by the end of this year. The airline's six DC-4s and four Convair 240s will go to Fairchild in part-exchange for the Friendships, which would seem to be a very favourable arrangement for Aerolineas, and one that will encourage the option on ten more Friendships to be taken up; the Dutch-designed turboprop will certainly give Aerolineas an edge over their competitors in the domestic field. The question of what type would be chosen to replace the DC-3, and when it could be introduced, has depended not least on the question of airports and the funds that can be made available to improve them. A. Cdre. Güiraldes expressed his profound encouragement at the President's understanding of air transport problems, "especially in respect of their economic and social importance," and these words may foreshadow a fairly rapid improvement in the general standard of Argentine domestic airfields.

The air commodore has also made the point that his airline's economic problems would be solved if it received half of the $30,000,000 or so spent annually in air travel in and out of Buenos Aires; foreign airlines at present absorb almost all this sum, as the table in column 1 emphasizes.

As can be seen, Aerolineas operate only two out of a total of 18 return services a week from the Argentine capital to Europe, and are at present the only airline to offer no first-class accommodation on these services. Their competitors all fly more modern aircraft with combination first/tourist interiors, and sleeping accommodation is available for first-class passengers on Air France, Alitalia, K.L.M., Panair do Brasil, S.A.S. and Swissair flights. All this would appear to place Aerolineas at an overwhelming competitive disadvantage, but for the fact that they are able to offer the lowest fare between Buenos Aires and Europe: their London - Buenos Aires tourist return fare is £324 15s, or £41 15s less than that charged by the other airlines. This special tourist rate offered by Aerolineas on its European services is actually a differential in favour of the smaller, slower and less commodious DC-6, and was obtained by Aerolineas through the normal I.A.T.A. rate-fixing machinery. This rate, which will not apply when Comets are introduced, serves as an interesting precedent for fare differentials between piston airliners of varying degrees of modernity, as well as between turboprop and turbojet, and is one of several reasons why Aerolineas found it cheaper to go directly from DC-6s to Comets rather than purchase interim equipment such as DC-6Bs, DC-7Cs or L-1049s before introducing jets.

After the downfall of the Peron regime in 1955 the policy of absolute State monopoly of Argentine air transport was relaxed, and a number of privately owned airlines are now operating; their activities were described in *Flight* for September 5, 1958. Indeed the pendulum swung away from monopoly to the extent that Transcontinental, S.A., made plans for operating jets in association with California Eastern Aviation, Inc., a whole year before Aerolineas Argentinas placed its order for six Comets, although the Comets will begin services about a year before Transcontinental's Convair 880s. Purchase of the latter is under-

The first D.H. Comet 4 for export, due for delivery to Buenos Aires as this issue appears



Soon to be replaced by Comets: one of the Aerolineas fleet of five DC-4s

COMETS FOR ARGENTINA . . .

stood to be conditional upon the arrangement of satisfactory financing; if this condition is fulfilled, present indications are that the Convair 880s will enter service early in 1960 between Buenos Aires and New York.

Transcontinental already operates B.A. - New York tourist services with 82-passenger L-1049H Super Constellations which stop at Sao Paulo, Rio de Janeiro and Caracas. Aerolineas are at present at a competitive disadvantage on this route in having to use the older DC-6s, which make more stops—at Rio, Belem (technical stop), Port of Spain and Havana on the Saturday service from Buenos Aires, and at Sao Paulo, Rio, Belem (technical) and Port of Spain on the Monday and Wednesday services from the Argentine capital. But—surprisingly perhaps—it is not Transcontinental who have succeeded in attracting traffic on this route from Aerolineas so much as the non-I.A.T.A. airlines operating cut-rate services to Miami and New York up the west coast of South America. So to meet this non-I.A.T.A. competition (and not, incidentally, because they use older aircraft than other I.A.T.A. carriers on this route) Aerolineas again offer a special tourist fare from New York, Havana and Port of Spain to South America, and vice versa; this fare is not, it should be emphasized, a differential in favour of the less competitive DC-6 but was established to meet non-I.A.T.A. competition. At $632.20 return to New York, it is no less than $240.40 below the tourist return fare to New York charged by Transcontinental, and also by Braniff, Pan American, Panagra and VARIG. There is also a first-class Aerolineas fare applicable only on the New York - Port of Spain and Havana - Port of Spain sectors of the network, and vice versa.

Thus of the two major Argentine airlines in direct competition on the New York - B.A. route, it is the State-owned operator, curiously enough, and not (as one would expect) the independent who offers cheaper fares in smaller, slower and less modern aircraft—a competitive situation that may well be unique. Also unusual is the fact that Transcontinental, although not yet a member of I.A.T.A., charge the same fare on this route as all the other I.A.T.A. carriers except Aerolineas Argentinas, who seemingly undercut I.A.T.A. rates with their special tourist fare (though, like the European fare, this was obtained by agreement with other I.A.T.A. member-airlines). Transcontinental have now integrated their flight schedules with the Brazilian carrier Real, with whom they have a pool agreement on U.S. services. Real, incidentally, might be willing to take over some or all of the Argentine independent's Convair 880s if finance could not be raised for these aircraft, or traffic to New York proved to be insufficient to justify their purchase.

Aerolineas' Comets will be introduced in two stages, the first beginning this year with three aircraft and the second in 1960. The first Comet service will be flown on May 25, which is Argentina's National Day of Liberation, and the first stage provides for five flights (later seven) a week to Santiago in Chile, four a week to New York and two a week to Europe, to be operated by the first three Comets. The fourth Comet will be delivered in the middle of 1960, followed at intervals by the fifth and sixth, and with these aircraft Aerolineas will begin the second stage of Comet operations by stepping up their New York services to a daily frequency, operating four times a week to Europe and a daily service to Santiago. The Comet will reduce the DC-6's flight time from Buenos Aires to New York from 26 hr 15 min to 11 hr 10 min, and will bring the Argentine capital within less than 24 hours of London.

Aerolineas Comets will have accommodation for 24 first-class passengers and 43 tourists. Styled by the well-known American firm of Charles Butler, the interior has light blue and brick red as its dominant colours. Slumberette-type seats are installed in the first-class compartments, and Aerogalley catering equipment in the two galleys. Ekco storm-warning radar is fitted as standard. Aerolineas reckon that the higher frequencies which will be possible with their 67-passenger Comets will, while maintaining good load-factors (the airline's DC-6s have 54-passenger interiors) match the competitive threat of Boeing 707s, Douglas DC-8s and Convair 880s operating into Buenos Aires in the nineteen-sixties; with seating for perhaps twice as many people, the bigger jets will have to be operated at a much lower frequency than Comets to ensure similar load-factors. In this connection it is worth quoting what the *de Havilland Gazette* said in its August, 1958, issue on the appeal of a frequent service operated by Comets:—

"Not only can today's traffic be carried with fewer aircraft than are required using current types—which makes the capital cost less while offering a superior service—but as bookings grow heavier due to the high competitive passenger appeal, frequency can be increased economically. Frequency itself has a high passenger appeal and generates more traffic again."

Another point in the Comet's favour is that its airfield requirements do not come up against temperature/altitude limitations nearly as much as those of the big jets, and it will be able to operate into such airports as Recife, Trinidad and Santiago which would impose economic penalties on the big jets. (It is, incidentally, for South American use that PanAm are considering Comets.)

Present plans call for an annual utilization of 3,240 hr for each Comet, and pending the completion of an engine overhaul facility at Buenos Aires the Avons will be overhauled by Rolls-Royce at Derby. Completion of this facility will coincide with the second stage of Comet operations, and Aerolineas will then overhaul their own Avons; they will, in fact, be the only company in South America to overhaul civil jet engines.

Aerolineas' jet re-equipment programme involves only two contracts: one with de Havilland for airframes and spares, the other with Rolls-Royce for engines and spares. Such things as ground starter units (by Auto Diesels Ltd.), tractors (by David Brown) and all the other items of ancillary equipment necessary for a jet fleet are included in the "spares" category and are not bought separately by Aerolineas, but are procured by Rolls-Royce or de Havilland with the airline's approval. This is obviously a simpler arrangement for a comparatively small airline than evaluating and buying each item separately as the larger U.S. and European carriers do. Over 150 Aerolineas personnel of all categories, ranging from flight dispatchers to captains, are at present on various technical courses at de Havilland and Rolls-Royce. A total of 30 pilots, consisting of three crews of ten pilots each, are being trained; most of them have been flying DC-6s, but some are graduating from DC-4s. Similarly, three crews of flight engineers (who will also be trained as pilots) are undergoing Comet conversion courses.

As mentioned earlier, the question of airports is a dominant factor in Aerolineas Argentinas' DC-3 replacement plans at the moment, for although the airline's choice has fallen on the Friendship, there must necessarily be an interim period in which the airport improvement programme is getting under way, and during this period—and possibly for some time afterwards—the present fleet of seventeen DC-3s will be retained. When some progress has been made in improving the present large number of DC-3-category airports to take larger and heavier aircraft, the Friendship route network can be extended, but present plans envisage that the turboprop will be used initially as a Convair 240 and DC-4 replacement rather than for superseding the DC-3s. The five DC-6s will be put on to regional services to neighbouring South American states—including a new one to Brazil's future capital, the inland city of Brasilia—and will also take over the more important domestic routes such as that to San Carlos de Bariloche, the well-known skiing resort in south-west Argentina. It is thought that there will be enough traffic on such routes to support the larger aircraft; flights from Buenos Aires to Bariloche, for instance, are often fully booked up two or three months ahead of the peak of the holiday season.

Load factors on Aerolineas' domestic services during the years 1950-56 have been exceptionally high; the figure for 1950 was 83 per cent and the lowest for any of these years was 75 per cent. February is the peak month for domestic routes, for the load factors for this particular month in 1957, 1956 and 1955 were, at 92 per cent, 89 per cent and 84 per cent respectively, the highest of any month in the year. One of the reasons for these high percentages is the inadequacy of surface transport, particularly railways.

But although the DC-3's ability to land virtually anywhere, and to make full use of the country's at present inadequate airports, makes it virtually indispensable to Aerolineas at present, there are some parts of the country where there are no aerodromes at all, particularly along the River Parana route from Buenos Aires to Asuncion which the airline's six Short Sandringhams operate. And because of this lack of aerodromes, the airline plans to retain the six Sandringhams for this route, even though they are no longer economical; some of them have now been in service with Aerolineas and its predecessors for no less than 13 years. These boats have a variety of interiors, accommodation in each case averaging about 50 passengers. They also operate between Buenos Aires and Montevideo, and are still popular with passengers. The Sandringhams may remain in service for quite a few years yet, although new economic developments in Argentina, in particular the exploitation of oilfields, will eventually render them obsolete by providing funds for new aerodromes to cater for Aerolineas Argentinas' growing domestic traffic.

Club Training for Commercial Pilots

WHAT ONE CLUB OFFERS: SOME OTHER METHODS: PROSPECTS OF A NATIONAL SCHOOL

Derby Aviation's school Chipmunks in neat formation over Elstree

AMONG sixth-formers who really know what they want to do when they leave school, few enthusiasms are held more passionately than by those who want to become airline pilots. Yet the first stumbling-blocks to realization come early and loom large. The aspirant is likely to encounter them as soon as he asks two questions: what is the initial step to take, and how expensive is the training?

Letters received by the Royal Aero Club, by *Flight*, and by various other organizations in a position to give information suggest that applicants seldom appreciate just how much commercial-pilot training—even on the simplest scale—is going to cost them. This matter of cost is clearly the chief obstacle to a wider influx of school-leavers into the ranks of professional pilots—much more so than other factors, such as the necessity of long daily journeys to the place of training, the relative inadequacy of a commercial licence and 150 hours' flying in obtaining an airline post, or (above all) the current scarcity of opportunities for freshly qualified commercial pilots.

Commercial-licence training fees, in spite of various schemes that have been proposed from time to time to bear or to amortize some of the cost, are bound to remain high while the demand for civil aircrews is low. It is perhaps small consolation to argue that most forms of training for professions are expensive and that the cost is (or should be) justified by the eventual rewards. As yet there is no possibility of reducing flying-training and ground-study fees by sitting for a scholarship—no such facilities at present exist. The Corporations are sympathetic (both B.O.A.C. and B.E.A. offer assistance to pilots selected to serve with them once they have obtained their commercial licences) but are not in a position to render assistance on a broad scale.

Nevertheless, with fewer ex-Service pilots available to the Corporations and the British independent airlines, a ready supply of trained pilots is an absolute necessity, and schemes have been proposed from time to time whereby some or all of the cost of training is borne by the Government, by the airlines, or both. A very promising proposal was advanced by General Air Training in 1957 (*Flight*, November 22, 1957). It was suggested that the cost of commercial pilot training should be advanced by the airlines and be paid back over the first years of employment. Although a few pilots have been trained under the aegis of G.A.T., the scheme seems to have foundered for lack of support.

As was made clear recently by Mr. John Hay, Joint Parliamentary Secretary to the M.T.C.A., the Government do not wish to sponsor training under a State contract (in the past year five organizations have advanced proposals for such schemes).

It might seem from the Government statement that the prospect of any officially supported commercial flying training scheme is very bleak. And at the moment this is indeed the case; but there are clear indications that a National Flying School, run on broadly similar lines to those in Holland and France, is being considered by the Government and by the national airlines.

Such a scheme might be realized by setting up a board of directors, the members of which would be senior executives of B.O.A.C., B.E.A. and the British Independent Air Transport Association, and on which the Ministry of Transport and Civil Aviation would be represented. It has been suggested that the training for a commercial pilot's licence and instrument rating at the national school would be accompanied by additional training of both a character-building and professional nature; and that the course would take two years and would cost about £5,500. How such a sum would be found, or how support for the scheme would be apportioned, is not yet clear; but it may be that each student would be aided by a specific grant from the Ministry of Education and by award of various scholarships.

Air Service Training at Hamble has been mentioned in connection with the scheme (it is also the school chosen by General Air Training) but since contract arrangements are viewed with disfavour by the M.T.C.A., it seems that a fairly drastic reorganization of A.S.T. might be involved before a national school could be established. Reports that A.S.T. might be taken over by a B.O.A.C.-B.E.A. board have neither been confirmed nor denied.

Although the details remain to be decided—they may, in fact, not be finalized for some considerable time—it seems likely that the purpose of a national school would be to offer not only flying and academic training of a high standard, but to provide for the first time a pilot's apprenticeship to the airline industry, which now has a very distinct identity of its own.

Until such a school becomes a reality—and for the moment the supply of pilots from other sources is still adequate—there are excellent flying training schools available for student pilots. The best known of these, already mentioned, is A.S.T. at Hamble, who offer very complete facilities for *ab initio* training to commercial licence and instrument rating standard. The A.S.T. course provides what few other schools can offer—self-contained training, accommodation and recreational facilities in one centre—and it is one of the only two schools in the country providing flying training on helicopters.

Another M.T.C.A.-approved course offering similar college-like facilities is the Airwork School of Aviation at Perth—almost at the other end of the British Isles from Hamble. The excellent reputation established by these two schools is international, and many of the students who attend them come from overseas.

But it is no reflection on the value for money offered by these specialized establishments that several flying clubs should recently have started to offer training to commercial licence standards at lower rates than those asked by Airwork or A.S.T.; the training, although reaching the same objective, is arranged on an altogether different basis, very rarely with all facilities under one roof and generally providing flying training only. Ground study—of which a great deal is necessary, is referred to an outside tutor, such as Avigation Ltd. of Ealing, or the London School of Air Navigation. Both schools also conduct postal courses, so that theoretical study can be undertaken alongside practical flying training.

To obtain M.T.C.A. approval, which permits a commercial licence to be granted to a pupil (provided he passes examinations satisfactorily) on completion of 150 hours' flying, a course must be run on lines which are deemed satisfactory by the Ministry, and there must be two full-time ground instructors. This requirement is frankly beyond the scope of most flying clubs offering commercial licence flying training, and it is argued that in any case 150 hours' *solo* flying is really required to train a pupil to a standard which includes an instrument rating—without which the commercial pilot's licence has little practical value.

Thus there are three types of school available: the well-established M.T.C.A.-approved flying "colleges"; flying clubs or schools offering the necessary *ab initio* flying training and ground instruction on a scale too small for official approval to be obtained (although completely satisfactory nevertheless); and clubs offering flying training only. Some clubs are able to offer living-in accommodation to limited numbers of pupils and most run lectures at various times throughout the year.

How do the fees for these various methods of training compare? And how long will training take? For a full-time student it should be possible to complete the course in less than a year, including training to instrument rating standard and passing the qualifying tests. The fees range upwards from £625 for flying training only for pupils with a private pilot's licence, to about £1,800 (at Perth) or £2,500 (at Hamble) for complete *ab initio* ground and flying training, accommodation, messing, kit, examination fees and recreational facilities. At Hamble the fees include 200 hr on elementary trainers and 35 hr on twins. A few pupils may be able to qualify with only 20 hours' twin flying time, in which case they can expect a rebate of £16 10s per flying hour. Both the Wiltshire School of Flying and Exeter Airport Ltd., who run commercial courses, offer limited accommodation at about £6 per week; other clubs suggest that digs within reach of the airfield can probably be found for a little less.

Between these extremes is a club such as Elstree, which offers flying training and ground instruction on the premises, but accommodation only in exceptional cases. Here the fee for a total of 216 hours' flying, ground instruction, and lecture notes for a 40-week course is £1,120. This does not include flying kit, accom-

Club Training for Commercial Pilots . . .

modation, messing or licence fees (which total, with the instrument rating, about £10), but credit facilities have now been arranged by the management for a proportion of this amount. For the club, this is economically near to the bone, but the additional flying hours more or less guaranteed by successive courses brings a reward in the utilization of aircraft and ground equipment; Elstree's Chipmunks last year averaged over 900 hr each, and this year may exceed 1,000 hr—an unusually impressive total for a single-engined light aeroplane. The economics of the operation are also assisted to some extent by the use of Austers (for post-P.P.L. cross-country training) belonging to an associate company, Derby Aerosurveys Ltd., who normally use these aircraft for aerial photography.

While no flying school is typical of any other, the training available at Elstree is examined here because it provides a good example of a flying club—in days when flying clubs are popularly supposed to be perpetually in the doldrums—expanding the scope of its activities to the mutual benefit of its members, its commercial-licence students, and its own finances. David Ogilvy, Elstree's manager, began to appreciate the potentialities of a C.P.L. course at the club while serving as a member of the Association of British Aero Clubs' pilotage committee. Instructional staff were available for additional flying training, the club boasted a Link trainer, and the first modified civil Chipmunks were just being put into service; in fact, at the time the idea was mooted three pupils were doing the flying part of their C.P.L. training with the club. Furthermore, Elstree is near London and a friendly relationship with Mr. Canton of Avigation made it possible for the students to attend ground school one day per week at Ealing, and for Avigation notes to be used for ground training in classrooms at Elstree Aerodrome.

Centralized Training

Nevertheless, it was always the intention of the Elstree Club to centralize ground and airborne training and, apart from a half-day at Ealing studying Avigation's tape-recorded sample R/T conversations, all the ground training is now done at Elstree.

January 28, 1958, was fixed as the date of commencement of the first Elstree commercial pilot's licence course, the three pupils on C.P.L. flying were offered ground training and the start of operations was extensively advertised to attract suitable pupils.

The response was good, and three applicants had to be turned down because of the limited size of the classrooms available—eight pupils from each course can be accommodated (two courses are run concurrently) but the optimum is really six (for comparison, some 40 students—two-thirds of them from overseas—are under training at any given moment at A.S.T. Hamble).

On the first course, five pupils from the London area were selected; one came from Germany, one from France and one from the Channel Islands. The length of course was established as 32 weeks with a further eight weeks devoted, if required, to instruction for an instrument rating. Full-time training is not insisted upon (some pupils retain their jobs while under instruction) but it is obviously desirable. Elstree were fortunate in obtaining the service of Capt. E. Brooke-Williams, recently retired from International Aeradio, as an able chief ground instructor for the bulk of academic subjects. The chief flying instructor, Eddie Wild, and another instructor, John Schooling (both M.T.C.A.-approved for this work) teach theory of flight, airframes and engines in lecture periods on Wednesday and Friday mornings, and radio is taught by a free-lance radio engineer. This integration of the flying and ground sides of the course, with instructors emphasizing subjects taught on the ground with practical illustrations in the air, is an important feature of training.

In spite of the rather bleak employment outlook for recently qualified commercial pilots, a second course was started at Elstree in May last year and a third started in October, a month after the first course finished. The progress of the first and subsequent courses was marked by half-term and completion reports from the C.F.I., C.G.I. and Mr. Ogilvy. Every inducement is offered to make the cost of training as easy to meet as possible and, apart from the initial payment of an £85 ground training fee, a pupil who fails to complete the course can expect a refund.

Normally, the financial arrangement made by the club is that the pupil pays a fee of £25 on enrolment and, on commencement of the course, the ground training fee and £100 down towards the cost of flying training.

Two students of the first eight failed to complete the first course; one, quickly spotted, was temperamentally unsuited to become a pilot; the other was unable to continue to find funds for training. Elstree had particular sympathy for the latter—who came from abroad—and have since concluded an agreement that may help young pupils (the average age of the first course was 22-23, and of the second 19-20) to finance an expensive training. By arrangement with the club's bankers, a deferred-payment scheme has been started which enables a pupil who is training in his spare time, and who is satisfactorily employed, to borrow £200 towards the cost of the course and repay it over 18 months.

The discipline of the course is the responsibility of the chief ground and flying instructors and, if necessary, the manager. An occasional strip-tearing session and a system of fines for minor offences (taxying with flaps down, bad parking and so on) is the most that has been required. With the exception of the two pupils who did not finish their training, commercial licences were obtained by all the students on the first course. Three courses have now been trained, two are under training, and further courses will start on April 21 and August 18.

The syllabus, given below, is gradually being revised as experience is obtained. For example, it was at first found that [illegible] cross-country trips tended to get shouldered out by bad weather until the very end of the course, so they are now flown-off earlier in the 40 weeks. There is, in fact, a considerable and continuous feed-back of experience as training progresses.

The club are fortunate in the assistance they get from the control tower at Luton Airport, of which extensive use is made for homings and for navigational exercises. A typical night cross-country is Elstree - Luton - Southend (for a landing), back to Luton and home to Elstree. Luton tower seem pleased to stay open to all hours to accommodate pupils under training and others who require their assistance.

Elstree are at present awaiting town and country planning approval for a new office block and control tower as an addition to the present buildings. A radio transmitter and receiver are already available, and it would probably be possible to install a D/F homer for controlled let-downs. All the club's instructors are getting approval for work in the tower, and a full-time controller would probably not at first be employed; the R/T receiver loudspeaker could be relayed to the C.F.I. or manager's offices. A small radar set is another aid which may be installed.

In one way in particular, Elstree-trained students are particularly fortunate. Backed by Derby Aviation, the club can give their pupils actual route experience during their training and are able to give twin time on Consul, Dakota or Anson as well as the Gemini. When they have obtained their R/T licence, all pupils are given a chance to fly as pilot's assistant in a Marathon on Derby Aviation's Derby - Glasgow run. This is normally a one-crew operation, and the cadet pilot sits in the right-hand seat.

The final weeks of the course are devoted to revision and examinations. Although these are stiff, and becoming more difficult, pupils trained on the Elstree course seem well able to reach the necessary standard; in the February examinations four out of five passed all their papers at the first attempt.

With the course completed, there still remains the problem of finding a job. This Elstree cannot guarantee, but they do operate an unofficial employment bureau. The best possibilities are probably overseas, and a season of hard and intensive agricultural flying in the outback may give valuable experience and confidence to a recently qualified pupil.

Nevertheless, not all the opportunities are abroad, and of the six pupils in the last course to pass through the Elstree training process no fewer than four have been absorbed in the expansion of the parent company, Derby Aviation. There can be little better recommendation for the product than that.

A. T. P.

COMMERCIAL PILOT'S LICENCE COURSE

Week No.	Subject Hours	Subject	Dual and Solo Flying time (hours)					
			C'munk		Auster		Total	
			D.	S.	D.	S.	D.	S.
5	30	To P.P.L. standard (inc. 5 hr link)	20	10	—	—	20	10
	3	Instrument flying	3	0	—	—	23	10
	7	Auster conversion	—	—	3	4	26	14
	20	Cross-country	—	—	2	18	28	32
	2	Type refresher	—	—	2	0	30	32
17	12	General handling (inc. 4 hr I.F.)	6	6	—	—	36	38
	5	Night circuits (inc. 5 hr link) ...	3	2	—	—	39	40
	20	Cross-country flights	0	5	0	15	39	60
	4	Cross-country, radio usage ...	2	2	—	—	41	62
	3	General handling, aerobatics ...	2	1	—	—	43	63
25	5	Night cross-country, circuits ...	2	3	—	—	45	66
	20	Cross-country flights	0	5	0	15	45	86
	6	Instrument flying	3	3	—	—	48	89
	8	Cross-country, radio usage ...	0	8	—	—	48	97
32	5	Final refresher	2	3	—	—	50	100
	150		43	48	7	52	(150)	

INSTRUMENT RATING COURSE

About 10 extra weeks	8	Instrument flying	8	0	—	—	58	100
	50	Cross-country flying	0	20	0	30	58	150
			Gemini					
	5	Twin conversion	3	2	—	—	61	152
	3	Twin I.F. (inc. 30 hr link) ...	3	0	—	—	64	152
	216		57	70	7	82	(216)	

Note: Handling refresher flying is given if required.

Development of an Airliner

A TRIUMVIRATE LECTURE AT THE R.Ae.S.

A LECTURE entitled the *Flight Development of an Aircraft before and During its Operation* was given in three parts at the Royal Aeronautical Society on February 24. The lecturers were Dr. A. E. Russell, director and chief engineer of Bristol Aircraft, who spoke from the designer's point of view; Mr. Charles Abell, chief engineer of B.O.A.C., speaking as an operator; and Mr. P. F. Green, assistant chief engineer Bristol Aero-Engines, who discussed engine development (Mr. Green stepped into the place of Dr. E. Warlow-Davies at very short notice). Chairman of the lecture was Mr. B. S. Shenstone, chief engineer of B.E.A. A summary of the proceedings follows.

DR. A. E. RUSSELL: Almost 1,000 Britannia-100 flying hours were devoted to airworthiness out of 2,300 flying hours accumulated up to the award of the C. of A. Corresponding times for the Britannia 300-series were 550 hr and 900 hr. The proportion of time spent on the main airworthiness groups was: structure, 5 per cent; propulsion, 12 per cent; handling, 15 per cent; systems, 18 per cent; performance, 20 per cent; route proving, 30 per cent.

The initial reliability of most new aeroplanes and especially their equipment could, said Dr. Russell, only be described as unsatisfactory. Suffering operators had to endure long settling-down periods before their engineering staff could function to routine maintenance schedules. So long as designers were tempted to adopt new and untried equipment, then they deserved the sleepless nights they would undoubtedly face. No matter how intoxicated they might feel by a new gadget, temptation must be resisted.

The problem of achieving a high standard of reliability was one of the most difficult the designer had to face. Development brought to light only some of the more malignant snags, while the so-called route proving period of 100 hr or so was "no more than a symbolic gesture towards trouble-shooting." Certainly the rate of defects diminished with time, but the settling period could take many tens of thousands of hours.

His conclusion was that pre-operational flying was too short to play more than a limited rôle in achieving reliability. "Those who are seeking salvation in greatly extended route-proving," he said, "are approaching the task from the wrong end." It was much less expensive to submit the component parts of the aircraft to more rigorous ground tests in correct environments and to improve the standard of equipment-approval certificates.

MR. CHARLES ABELL: B.O.A.C.'s chief engineer could hardly agree with much of what the previous speaker had said. Smiling, he added that he was surprised they were both in the same room after all they had been through together. He was of the opinion that no amount of pre-service flying was able to eradicate troubles: "the only thing to do is to buy an aircraft which had been developed by another airline." Even the unusual amount of Britannia pre-service development had been insufficient to remove all the bugs—or even to show up many of them.

So great nowadays was the capital cost of equipment that it was more important than ever to build up high utilisation early in the life of a fleet (see graph below). An aircraft like the 707 or the VC.10 could, he said, cost B.O.A.C. £950 per day, per aircraft, solely for obsolescence and insurance.

Mr. Abell then discussed and illustrated the economics of spares-holdings, with some favourable comments about the record of the Proteus. It was likely, even at the best, that there would be some surplus engines after two or three years' operation, however accurate the forecasts about the build-up of overhaul life, casualty rate, overhaul-elapsed time, etc. Talking generally, he said that as each engine would cost anything up to £90,000, it could be understood that accurate spares-planning was a vital exercise. "By cutting elapsed time for overhaul from seven weeks to three weeks—we hope eventually to less than two weeks—and by increasing the rate of increase of overhaul life we hope to cut our holdings for future types to 60 per cent or less." On a fleet of 35 VC.10s this could mean a saving in capital investment of almost £5 million.

The lecturer showed a slide depicting B.O.A.C.'s experience of the time interval between first delivery of a type and its entry into service. In the case of the 707 B.O.A.C. were hoping to reduce the time to less than two months. Other slides—showing comparative maintenance man-hours, modification man-hours (2.1 man-hours per flying hour on the Britannia 102), and other items—emphasized the difference to an operator between a developed aeroplane and a new aeroplane.

In conclusion Mr. Abell said that not nearly enough representative components and systems-testing had been done in the past, or was being done now. "This may be expensive, but it is not so expensive as building aeroplanes and flying them for many hours or months. Nor is it so expensive as modifications."

These things had to be tackled by the whole industry if Britain was to remain a serious competitor in world-wide markets. Money had to be spent on research and testing facilities for components and systems. In addition more flying had to be done in representative airline conditions; and "I would suggest that the two Corporations are best equipped to do this latter work quickly and relatively cheaply. Such flying, however, should be done as a development contract . . ."

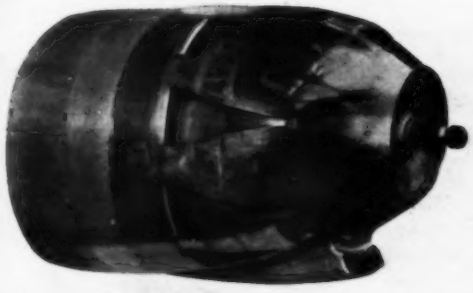
MR. P. F. GREEN: At very short notice the last speaker outlined the Proteus development story. He said that progress had been excellent but that it was, after all, only what was expected by airlines.

Mr. Green outlined highlights such as the de-icing problem (see picture) and overspeed tests (including a 25 per cent overspeed in one third of a second on one shear test).

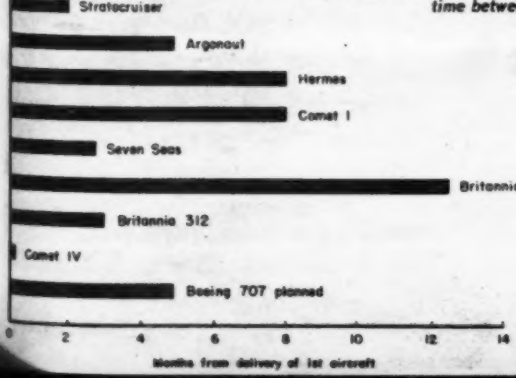
MR. B. S. SHENSTONE, chairman, summed up by noting the profound difference of opinion about the relative importance of pre-service ground development and flight development.

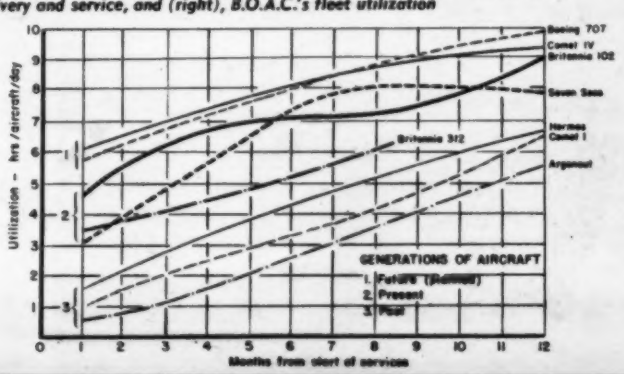
MR. R. C. MORGAN (B.E.A.'s chief project and development engineer) contributed as follows: "I would say categorically that the only people who can do the job of developing a new airliner are the manufacturer and the initial operator working together."

MR. P. G. MASEFIELD referred to the need for Government development contracts as the answer to the problem; and Mr. Abell subsequently added that if such development charges could be written off over a bigger number of aircraft, as in America, the Government development contract would be a good public investment as he believed it had been in the case of the Viscount.



Hitherto unpublished, and one of Mr. Green's illustrations, is this picture of an experimental NACA-intake Proteus, one R.A.E. solution to the old dry-ice problem. The principle was momentum-separation of the ice-crystals: it worked, but with a 4 per cent range-penalty. Below, Mr. Abell's illustrations (left) of time between delivery and service, and (right), B.O.A.C.'s fleet utilization





Sisters under their skins

SOME of these Fokker F.27 Friendship feederliners (two Rolls-Royce Dart turboprops) were built by Fokker in Amsterdam; others by Fairchild, the American licensee, at Hagerstown, Maryland. Some are chastely styled; others gaudily. Yet their relationship is that which Kipling declared to exist between the Colonel's Lady and Judy O'Grady; for all are characterized by the engineering excellence with which the names of Fokker and Rolls-Royce are identified. The big picture shows the first aircraft for Northern Consolidated Airlines.

Aer Lingus
NCA
Quebecair

The Silver Dart replica being flown by W/C. Paul Hartman at the anniversary celebrations at Baddeck, Nova Scotia on February 23, 1959, fifty years after the historic flight illustrated at the foot of this page

J. A. D. McCurdy Honoured at Baddeck and at Montreal: A Silver Dart Flies Once More (but briefly) After Fifty Years

CANADIAN CELEBRATION

COMMEMORATING the fiftieth anniversary of the first powered flight by a Canadian in Canada—and also the first by a British subject in the British Empire—Canada's jubilee programme got under way on Monday, February 23. This was the anniversary of the day in 1909 when J. A. D. McCurdy made his half-mile flight above the ice of Bras d'Or Lakes at Baddeck, Nova Scotia, in the Silver Dart aircraft produced by the Aerial Experiment Association, the pioneer group founded by Dr. Alexander Graham Bell.

At Baddeck, 13,000 spectators were present to watch W/C. Paul Hartman, D.F.C., D.F.M., R.C.A.F., fly the Silver Dart replica from the ice of the Bras d'Or Lakes. Hartman had made a number of previous flights in the machine and had reported that it was a very delightful light aeroplane—provided a cross-wind landing was not required. At 11 o'clock on the anniversary morning he took off, and flew well for about half a mile before strong gusts of wind caused him to lose control of the machine. The aircraft made a hard landing, damaging the port wing and the undercarriage, but Hartman was unhurt.

After the flight W/C. Hartman said that he was very disappointed at the accident, but Mr. McCurdy, who was guest of honour at the celebration, described the flight as marvellous. "This was the sort of thing pilots faced on every flight," he recalled.

A special honour which had been kept a secret from the pioneer pilot was his appointment, announced at a luncheon following the morning celebrations, as an honorary air commodore of the R.C.A.F. McCurdy had been credited by Prime Minister Robert Borden during the first world war with suggesting the formation of a Canadian air force (the R.C.A.F. was founded in 1924).

Among the people who watched the anniversary flight were several who had witnessed the original flight by McCurdy fifty years previously. Some of their sons and daughters present were taking part, in period costume, in a tableau staged by the Victoria County Drama Society to represent Dr. Alexander Graham Bell, his family and scientific associates.

The Canadian Post Office marked the occasion by issuing a special five-cent stamp on February 23 (which, ironically, depicted three Avro Arrows as well as the Silver Dart), and a limited number of first-day covers was flown in the Silver Dart replica. This mail was destined for the Queen, Mr. Macmillan, General de Gaulle, President Eisenhower and other people and organizations—including *Flight*—having a particular interest in the anniversary.

Inside the first-day covers was the following message from Mr. McCurdy:—

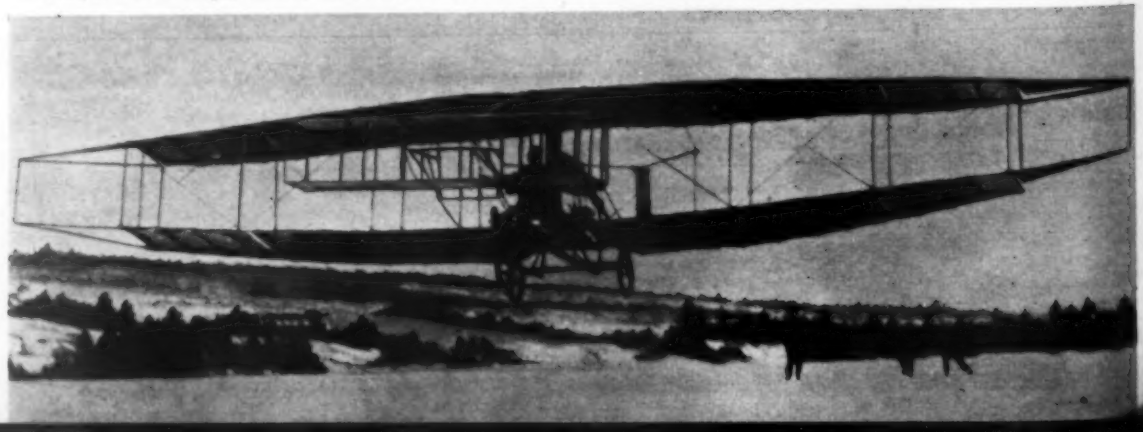
"Just fifty years ago it fell to my lot to make the first powered aircraft flight in Canada. I look back over half a century of aviation in our country with considerable pride. Since that first short flight at Baddeck to today's trans-Canada passenger schedules much has been accomplished in the aeronautical engineering and transport fields. I pay tribute to those who have made it possible. I would especially commend to your thoughts those pioneers who in the early years of Canadian aviation went into the north to explore for new and as then unknown natural resources which have made this country rich. I ask you also to remember those who in this period twice answered the call of duty and in the air gave all to their country."

The Baddeck celebrations include participation by the three Canadian Services; approximately 1,000 dignitaries were present by special invitation; and the total crowd was almost six times that which had been expected by the organizers. Following the morning ceremony and his introduction by Premier Robert Stanfield of Nova Scotia, Mr. McCurdy thanked the townsfolk of Baddeck for the testimonial dinner which they had held in his honour on Saturday, February 21, and for a day in his life, which, he said, he would never forget.

The R.C.A.F. replica of the Silver Dart was constructed at R.C.A.F. Trenton and, later, Mountainview, Ontario, by a group from No. 6 Repair Depot led by L.A/C. Lionel G. McCaffrey. The completed replica was publicly shown at an Air Force Day display at Trenton and at the 1958 Canadian National Exhibition in Toronto.

On the evening of February 23 commemorative dinners were held at Sydney and Halifax, Nova Scotia; Montreal; and many

Pilot, J. A. D. McCurdy; aircraft, Silver Dart; date, February 23, 1909—first powered flight by a British subject in the British Empire



Rank of honorary air commodore, R.C.A.F., was conferred on McCurdy by Air Marshal H. Campbell (C. M. Anson, Baddeck host, at rear)

Left, McCurdy extends best wishes to W/C. Hartman before flight of the replica. Hartman's flight—and McCurdy's—covered half a mile

Below, first-day anniversary cover, signed by both McCurdy and Hartman and carried on the Silver Dart replica at Baddeck.

other centres. With co-operation from R.C.A.F. Transport Command, Mr. McCurdy and other V.I.P.s were able to attend the Montreal dinner, which coincided with a special two-day meeting of the Canadian Aeronautical Institute held at the Queen Elizabeth Hotel.

The guest of honour and principal speaker at the Montreal dinner was His Excellency the Rt. Hon. Vincent Massey, Governor-General of Canada. Mr. McCurdy was special guest and Dr. G. N. Patterson, president of the Canadian Aeronautical Institute, was chairman. In his speech, Governor-General Massey emphasized the part played by aircraft in the development of Canada. "It probably has meant more to us than it has to any other country," he said. "I think it is true to say that nowhere else did pioneer flying play such a part in national development."

AVRO CANADA'S FUTURE: ARGUMENT AND DISCUSSION

FEW government decisions have had as drastic an effect on a country's aircraft industry, nor aroused such controversy and unpopularity, as the announcement by Mr. Diefenbaker in the Canadian House of Commons on February 20 that the Avro Arrow and Orenda Iroquois programmes were to be terminated immediately. Casting a gloomy shadow over the Dominion's Golden Jubilee celebrations, the announcement—and the resulting dismissal of virtually all employees of Avro Aircraft Ltd. and Orenda Engines Ltd.—was followed by a week which began with bitter criticism by government, opposition and the parent A. V. Roe (Canada) company and ended with joint discussions on the question of the future of the two firms and their dismissed employees.

On Monday, February 23, in a special debate in the House of Commons at Ottawa, Mr. Lester Pearson, leader of the opposition, charged the government with "confusion, uncertainty and bungling" in its decision to cancel the Arrow. He said he was informed there was a 50 per cent chance of Bomarc not functioning, and he suggested that Canada should transfer her defence purchases from the U.S.A. to Britain or continental Europe.

Mr. Diefenbaker said that the government would endeavour to preserve intact the segment of the Canadian aircraft industry now affected by the Arrow cancellation, but he went on to criticize A. V. Roe (Canada) Ltd. in the following terms:—

The company, he said, had hidden from its own employees and staff the knowledge that since last September the government was serious in its intention to discard the Arrow programme. It had engaged in a high-pressure campaign of lobbying and influence in an attempt to force the government to change its decision. It had immediately dismissed the 14,000 employees in an attempt to embarrass the government and arouse public resentment. It had not used the period of grace provided since the warning of cancellation last September to obtain new contracts to lessen the impact of the end of the Arrow programme. In addition, the company had failed to advance a single serious proposal of alternative work. The Prime Minister said that $50 million had already been earmarked in next year's estimates, in addition to money available up to March 31, to ease the impact of the cancellation.

Senior government officials, Mr. Diefenbaker said, had been cautious of the only recent bid by Avro for alternative work. Under this proposal the company wanted $30 million from the government for the development of a short-range jet aircraft to replace T.C.A.'s Viscounts. It also required a T.C.A. order of 25 machines in order to meet a price of $2.5 million per aircraft.

The Minister of Defence, Mr. Pearkes, told the House that the total expenditure on the Arrow programme up to January 31, 1959, was $341 million, and that, during discussions on the future of the aircraft the government had been concerned about the limited range of the machine. This, Mr. Peakes said, had been quoted as 238 n.m. supersonically or 347 n.m. subsonically.

Proposals for other work made last week by Mr. Crawford Gordon included the accelerated development and production of a revolutionary type of vertical take-off family of aircraft (a reference to the Project Y "flying saucer" machines now being constructed by Avro Aircraft for the U.S.A.F.); an increase in the design engineering work now being done by Orenda in the development of commercial nuclear power; and the initiation of a Commonwealth programme for the exploration of space. According to Canadian newspaper reports, two Project Y vehicles have been built and the first should be ready for flight tests in two months' time. The reports said that, following the termination of Canadian government interest in this after spending almost $400,000, the U.S.A.F. had spent $5 million on the project and Avro had spent $3 million on it.

On Tuesday, February 24, discussions began between Mr. Gordon and Mr. F. Smye of Avro and the Canadian Prime Minister and other Ministers. No official report of the talks was issued. The meetings between the government and company representatives continued throughout the week.

Sir Roy Dobson, managing director of the Hawker Siddeley Group and chairman of A. V. Roe (Canada) Ltd. denied in a statement issued in London on February 24 that the dismissal of the 14,000 employees of Avro Aircraft and Orenda Engines was intended to embarrass the Canadian government. The decision to dismiss the work-force, he said, was forced upon the company by the Canadian government's failure to take it into its confidence and give it reasonable advance notice of its intention.

Mr. Donald Fleming, Canadian Minister of Finance, announced on Friday, February 27 that the government had agreed to share with Avro the wage costs of "certain technical work" for the next six months, to keep intact an "essential nucleus" of technicians. Further study would also be given to the company's proposals for new work and extensions of existing programmes "in the fields of military and civil aviation and nuclear power."

Sport: a gull-wing Musger Mg 19a of the Alpine Gliding School at Zell am See soaring over the Austrian Alps. This sailplane is used for dual instruction at the school, which also has Bergfalke two-seaters and Spatz, Grunau and Hütte single-seaters. Tug aircraft used is a Piper Super Cub

Sport and Business

GUEST OF HONOUR at the annual dinner of London Gliding Club on Saturday last, February 28, was Mrs. Cuthbert Orde, secretary of the British Gliding Association from 1949 to 1954. Among the other guests present was Mr. F. N. Slingsby, who proposed the toast to the club, and other speeches were made by N. P. Anson, R. D. Ruffett, Mrs. J. R. Jeffries and P. Ramsden.

The presentation of awards and trophies was made by John Furlong, president of the club. The Dent Cup for the best flight of the year was won by John Westhorpe who, on what was only his second cross-country, had flown from Dunstable to Plymouth in a Skylark 2—a diamond goal flight. Honourably mentioned was Norman Preston for a Gull 1 flight from Dunstable to the vicinity of Plymouth. Geoffrey Butt received the Derry Trophy for the best job for the club for his efforts on the "works and bricks" side, with honourable mention going to Harold Tarnow; and the Desoutter Trophy for the best constructional effort was presented to Vic Ginn. In addition to rebuilding a crashed Olympia, Mr. Ginn has built the wing structure of a tandem two-seater of original design, known as the Kestrel, now under construction at Dunstable as a semi-private venture. John Charters, as the best *ab initio* pupil of the year, received the Cellon Cup.

PRIVATE AND CLUB FLYING was referred to by the Joint Parliamentary Secretary to the Ministry of Transport and Civil Aviation, Mr. John Hay (who has succeeded Mr. Airey Neave as chairman of the Standing Joint Committee on Private and Club Flying and Gliding) at the Airport Owners' Association dinner on February 25. One of the main problems being considered by the Standing Joint Committee, he said, was the provision of adequate ground facilities for flying clubs. Many clubs had been operating on State airfields, with limited security of tenure: many of these airfields were now being disposed of and it was often difficult to rehouse the clubs affected. Mr. Hay suggested that A.O.A. members might expand the facilities available for the popular flying movement. The committee would appreciate the Association's advice on this problem, and the Ministry hoped that the aerodrome owners would assist in fostering this branch of civil aviation as much as possible.

A FILM ON CLUB FLYING is to be produced by Elstree Flying Club. A farewell presentation to retiring C.F.I. Bill Bailey was made on February 7; forthcoming events at Elstree include a Students' Night on Wednesday, March 11 and a Spring Party on April 11.

A BRIGADYR L60, purchased from Czechoslovakia by the government of Ceylon, is to be used for crop-spraying work to protect the island's paddy fields. A more general spraying campaign against other crop pests may follow.

SETS OF PLANS of light aircraft obtainable from the Popular Flying Association, 19 Park Lane, London, W.1, are listed in the current issue of *Popular Flying*, the P.F.A. magazine. Plans for the Druine Turbulent cost £10 10s; those for the Luton Minor and Currie Wot, £12 10s each; the Druine Turbi, £15 15s; Luton Major, £20; and Druine Condor and Piel Emeraude, £35 each. This particular issue is a useful reference source for would-be amateur constructors: it contains a reprint of the airworthiness certification procedure for ultra-light aircraft; a directory of suppliers of aircraft, engines and plans; and a list of recommended engines for seven light-aircraft types.

R.A.F. GLIDER PILOTS are well represented among the 1958 winners of the annual awards of the British Gliding Association, which are to be presented by Mr. Peter Masefield at the Gliding Ball at Londonderry House on Friday next, March 13. The awards are as follows:

De Havilland Cup for gain of height, F/L. Anthony T. Morgan (a Fighter Command liaison officer with Gloster Aircraft Co.): 15,340ft in an Olympia from Nympsfield.

Wakefield Trophy for greatest distance, Sgt. A. W. Gough (a mechanical transport fitter at R.A.F. Wildenrath): 348 miles from South Cerney to Heerlen, on the Dutch/German frontier, in a Skylark 3.

Volk Cup for best out-and-return, Sgt. John Williamson (a radar instructor at R.A.F. Yatesbury) and Mrs. Ann Welch: 102 miles from Lasham to Westbury and back in a T.42 Eagle.

Seager Cup for best two-seater performance, Walter A. H. Kahn (a Surrey Gliding Club instructor and R.A.F.V.R. flight lieutenant) and Sgt. Williamson: 195-mile goal flight at 43 m.p.h. from Odiham to Perranporth in a T.42 Eagle.

Manio Cup for best goal flight, Paul Minton (Surrey Gliding Club): 204-mile dog-leg flight from Lasham to Great Yarmouth via Edgehill in a Skylark 3.

California-in-England Trophy for longest flight by a woman, Mrs. Ann Burns (Surrey Gliding Club): 192 miles from Lasham to Perranporth in a Skylark 3.

RECENTLY PUBLISHED by the Irish Department of Industry and Commerce is its report of the accident to Irish Air Charter's Piper Apache in which Major A. C. Morgan, chief pilot and technical manager of the company, lost his life. The accident was caused, says the report, by loss of control shortly after take-off in poor visibility when the cabin door opened in flight. This occurrence, said to be "not infrequent in Apache aircraft," would have caused extreme tail buffet and difficulty in maintaining control.

Business: the Grumman Gulfstream, powered by two Rolls-Royce Darts, bears a marked resemblance to the Avro 748 project, the subject of an artist's impression in last week's issue

Straight and Level

AN incident probably unique in air transport history took place last week. Weary of the engineering strike which has grounded the Plummet Air Lines fleet for 16 weeks, the chairman, Sir Charles Boost, decided to return from his 16-week yachting holiday in the Seychelles to address the men himself.

Precariously balanced on the nose of a corroding Speedmaster, and characteristically attired in goggles and flying helmet, he appealed to the men to see reason:—

"You are a lot of mugs. You have been bamboozled by disruptive Communist elements who are agents of the Kremlin. This strike is an unconstitutional dishonouring of agreements, and I say raspberries to the lot of you. Get back to work. It is the right of management to manage. . . ."

At this point Mr. Alf Slurry, works convenor of the joint sectional panel for the national trades union side of the clerical operatives and metal workers' union, leapt on to the Speedmaster's nose and wrenched the microphone from Sir Charles's hand. He cried: "Brothers, management are a lot of mugs. They have been bamboozled by capitalist elements who are agents of Wall Street. This strike is a constitutional working-class stand for the principles of collective bargaining. We are the élite of the industry. . . ."

Mr. Slurry's words were lost in the most dreadful noise of rending metal as moderate representatives of Plummet's management and workers, acting together in a spirit of co-operation, etc., etc., retracted the undercarriage of the Speedmaster.

● There is no doubt that one of the best training courses in aeronautical engineering in this country is the one given to the apprentices and technical college students of R.A.E. Farnborough. At the recent prizegiving ceremony more than 70 special prizes (apart from H.N.C.s, O.N.C.s, and other educational awards) were distributed, presumably in recognition of pretty hard work and application by the students concerned.

Unfortunately, a colleague who was present tells me, this high standard did not extend to the clothes worn by the students. Several seemed to be dressed for an informal rock 'n' roll session, for painting the garage or for working on the motorbike, rather than for what is presumably judged to be a fairly important and formal occasion.

I have no wish to provide ammunition for the brigade who are continually claiming that the younger generation is decadent and aimless, and that the country is therefore going to the dogs. But I would suggest that students *might* wear jackets, *might* take off their scarves and *might* get their trousers pressed before coming up to the platform for their prizes. Perhaps a solution would be to add yet another prize or two to the College's already formidable collection. How about the Austin Reed Prize for the Best-pressed Student, or the Hector Powe Award for the Apprentice Best Suited to the Occasion?

"My dear, I washed my helmet in paraffin last night as you suggested and now I can't do a *thing* with it. So that's why I've come along to this Air BP exhibition. I'm *sure* they have the right grade for *everything* . . ."

● Another Atcherley story (see last week's leading article)—the story of a transatlantic flight hoax that never took place—was told by the Chief of the Air Staff, Marshal of the R.A.F. Sir Dermot Boyle, when he recently unveiled the portrait of Air Marshal Sir Richard Atcherley.

The plan, devised before Lindbergh's first solo crossing in 1927, was made possible by the likeness of Richard to his twin brother David. Richard was to take-off and disappear somewhere in Europe. David was meanwhile to cross the Atlantic by ship—and also to disappear somewhere. Then, with suspense built up, David was to turn up in flying kit, haggard and unshaven, to be hailed as the first pilot to have crossed the Atlantic solo.

"Financial difficulties prevented what might have been the hoax of the century," said Sir Dermot.

Mitteleuropa, Aug. 1, 1993

● At the 743rd plenary session council meeting of NATOH (Never Accept The Other's Hardware), it was finally agreed that the VTO strike fighter to specification SFX.53B would be jointly planned by the Romano-Frankish consortium agreed at the 742nd session.

With Yankish assistance, the work would be subdivided as follows: airframe, Franks; propulsion, Goths (licence from the Angles); fire-control, joint Teuton/Hun system; ground-support equipment, joint Romano/Vandal concept; handbooks and technical training to be decided between Ostrogoth/Norse team or—owing to representations made by the foreign minister of the Angles—Saxon/Celt.

In view of the recent Teuton/Vandal trade agreement it was considered unlikely that the Vandals would agree to the Huns sharing in the fire-control, while the anger of the Franks at being eliminated from the propulsion field was likely to produce a stalemate in the production of the airframe, rendered more acute by insistence of the Angles in adhering to their obligations to their commonwealth.

These factors were considered likely to result in delays additional to the 33 years and one month since the specification was issued. As a stop-gap it was agreed to accept the Yankish offer of 100 F-118s, which would be free but whose spare parts would cost 78,901,234 thalers daily.

● "All of us in civil aviation have been living in the air space with jets for at least 10 years. We've been getting along with jets in the traffic control system on a scale far larger than the airlines ever will be able to generate. There are more B-47 and B-52 jet bombers alone using the system this very minute than there will be jet transports used by all U.S. airlines in the foreseeable future. These bombers, and the thousands of other jet fighters, bombers and trainers, are considerably 'hotter' and more critical in their performance than any known jet transport plane would ever be permitted to be.

"Matter of fact, the Boeing 707 and Douglas DC-8 are in many ways gentler and safer transports than their piston-engine counterparts. But this knowledge doesn't fit the 'jet age' campaign plan, so few people outside the aviation industry are told such facts.

"The 'coming jet age' is largely a hoax. But so far as the airlines are concerned, it's probably the most profitable hoax in the history of hoaxing."—From the *AOPA Pilot*, journal of the Aircraft Owners and Pilots Association, Washington, D.C.

● *"Nothing like that has ever happened. Our chaps have a lot of other things to do. Why would they interfere with an airliner? It is not true."*—
—Admiral Liu Hoh-Tu, of the Chinese Nationalist Ministry of Defence, on the "buzzing" of a Comet 4 by a Chinese Sabre (a photograph of which appeared in *Flight* of February 6).

ROGER BACON

Air Transport in a United Europe

THE first steps are now being taken to create an integrated air transport system in Europe. An article in last week's issue discussed the broad implications of this development. This second examines in closer detail the shape of things to come.

UNCOUTH names such as Europair and Eurocontrol have recently been bandied about as titles likely to be given to certain institutions reportedly aimed at clearing up the confused tangle of European air transport. That these institutions have invariably been associated with the Common Market is a sign that the situation is but vaguely understood, for the influence of the Common Market on civil aviation is slight. It is worth recalling that the terms of reference of the Market are clearly limited to the reduction of restrictions on the flow of goods within The Six (Belgium, France, Germany, Italy, Luxembourg and the Netherlands) and to the creation of a Customs union whereby common external tariffs will be set for each member-country on goods coming from countries outside the Common Market.

Action in these two fields by the European Economic Community—the official body established to administer the Common Market scheme—could be felt directly in the airline industry in a number of ways. The most obvious, but possibly the least important in practice, are reductions in Customs duties and increases in quotas on aircraft and related products. Theoretically, such measures favour manufacturers within the Common Market at the expense of foreign manufacturers. Where, for instance, comparable British and French aircraft were being offered to K.L.M., then the existence of a higher import duty would count against the British article. But in practice the effects of Customs reductions are alone unlikely to have much effect on new airliner sales. In the first place, aircraft are not on the main list of items upon which agreement has been reached. Considerations of defence and prestige led the governments of The Six to agree to put aircraft and aero-engines into a separate category—known as list G—which will be the subject not of general consideration but of individual negotiation. Secondly, restrictions on purchase of foreign aircraft by the national European carriers are usually slight and are often waived. Aircraft spares and components are, however, a field in which reductions in Customs duty will perhaps be felt and this raises the possibility of Continental operators replacing installed British equipment by the products of the French and Italian industries. Here again it would seem that the immediate threat to British manufacturers is insignificant, for buying policy places a higher priority on technical suitability than on price. The continuing popularity of high-cost American equipment bears witness to this.

A less direct but more significant field in which the European Economic Community are likely to move is in the elimination of price distortions in the Common Market's air transport industry. The E.C.S.C., which for the past seven years have administered a common market in the coal and steel industries of The Six, have acted with great energy in removing transportation price distortions, and it is certain that the lessons learned in this restricted sphere will be extended to the whole broad range of intra-European trade. One particular problem the E.C.S.C. tackled was the effect of distortions in freight rates. Granting of favoured rates to local concerns will have the same effect as a tariff on imports. For this reason energetic steps have been taken to insure that the fare structure of Europe's railways and waterways does not favour the local article at the expense of imports.

Eliminating Discrimination

Extension of these ideas to civil aviation could bring about a remarkable change in the structure of European air rates and fares. The present position is that I.A.T.A. jurisdiction applies only to international routes, internal rates and fares within each country being entirely a matter for arrangement between airlines and governments. At present the action of merely passing across an international border has the effect of greatly increasing the transport charge. This is partly the result of national policy which has invariably encouraged the operation of sub-economic domestic air services, the resulting loss being either subsidized directly or financed through the profits earned on international services. There also happen to be some perfectly valid reasons why border crossing should be an expensive business, notably the unfortunate fact that political obstacles impose various cost penalties on the international operator. The E.C.S.C. are fully aware of this problem in their dealings with the steel and coal industry and have done much work in the field which airlines have chosen to describe as "facilitation." The E.E.C. will doubtless follow up this good work on a broader front, and will provide official backing to the activities of I.A.T.A.'s facilitation committees. The carriage of international air freight, in particular, has been handicapped in Europe by elaborate but unnecessary Customs procedures.

Another form of discrimination which the E.E.C. are likely to investigate is the placing of restrictions over marketing. In the case of the common market in coal and steel the E.C.S.C. found that pressure was being brought upon dealers to discourage trading in imported goods. A similar problem exists in the field of air transport. In certain European countries various restrictions are placed on the sales effort taken by foreign carriers. Fortunately, the worst offenders lie outside the area covered by the Common Market.

Less obvious forms of discrimination also hinder the free flow of Europe's air traffic. Problems have often arisen over passenger and aircraft handling arrangements, and foreign airlines on occasions have had no choice but to use agents who fail to put their clients interests first. Foreign airlines are also discriminated against in regard to costs. Landing fees provide a case in point where local airlines are often favoured *vis-à-vis* foreign operators. For this there can sometimes be economic justification on the grounds that the local operator is often the most frequent user and is entitled to some form of "bulk discount." But there are many instances where such reasoning does not apply.

The effect of the Common Market on European air transport can be briefly described: it will tend to eliminate the existing discriminations which obstruct the European operations of the scheduled and charter companies based in the Common Market zone. But the growing ideal of a united Europe, from which the Common Market scheme gained inspiration, will necessarily lead to a closer co-ordination of European air transport. Four fields, in particular, deserve the attention of an unbiased, trustworthy, centralized, supra-national authority.

Scope for Rationalization

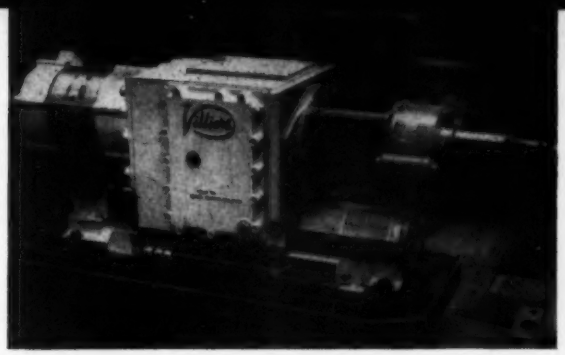
The most urgent of these is undoubtedly the problem of air traffic control. That transport ministries in The Six are fully aware of the gravity of this problem is evident from the conferences of civil aviation directors that have been held since last autumn. From these meetings has arisen the concept of Eurocontrol—a unified scheme to control the crowded air corridors of Europe. At the present stage there are strong reasons why this scheme cannot come under the umbrella of the E.E.C., the most significant being the present restriction of the community's membership to The Six. No satisfactory scheme can be devised that excludes Austria, Britain, Denmark, Norway, Sweden and Switzerland. One compromise would be for Eurocontrol to be administered through the Organization for European Economic Co-operation: membership of the O.E.E.C. includes 17 European and Mediterranean States. Another compromise would be for The Six to set up a centralized A.T.C. agency and for members of The Eleven to join, along the same loose lines that Britain has already followed in participating in Euratom and E.C.S.C. Another international organization, NATO, cannot be ignored in these discussions, for the relationship between military and civil aviation is one of the major problems to be tackled in sorting out Europe's confused traffic situation.

A less dramatic field in which supra-national supervision would be justified is in the field of economic regulation. European carriers have been forced by political considerations to adopt network patterns and operating schedules which are widely acknowledged to be far removed from the economic optimum. Airlines have sought to overcome some of these difficulties by the clumsy expedient of pool agreements. Another device which airlines could exploit more widely is that of aircraft interchange. America's keenly competitive carriers have for some years realized the need for interchange arrangements, but few European airlines have yet negotiated such agreements.

A more ambitious step would be to create a European Air Board on the lines of the American C.A.B. Such an agency would concentrate on the award of route licences and on the setting of rates and fares within Europe. The sacrifice of national sovereignty that this would involve would certainly lead to opposition from a section of public opinion both in the U.K. and in the Continent. Such a sacrifice might also be opposed by various European carriers. The undeniable fact remains, however, that an economically healthy European air transport system is unlikely to emerge as long as each country's rights are determined by bilateral treaties.

Should schemes such as this be too Utopian in concept to secure early acceptance, there still remain various economic fields in which a closer integration may be achieved. Rationalization of equipment and co-ordination of engineering facilities stand out as two particular instances where action is already being taken. Swissair and S.A.S. last October revealed details of integration along these very lines. Although neither Switzerland nor

[*Concluded at foot of page 327*]



Speed and adaptability in machining operations are conferred by the range of unit heads designed and manufactured by Villiers (Tool Developments) Ltd., of Wednesfield, Wolverhampton, Staffs. Applications include drilling, boring, reaming, tapping, milling and spotfacing. Feeds and speeds are determined by pick-off gears, and over 30,000 feeds are available from stock

THE INDUSTRY

Starters for the Royal Navy

A FURTHER order has been received by Blackburn and General Aircraft from the Admiralty, for starter trolleys and pods. This is in addition to orders already placed for similar equipment for starting R.N. aircraft, and it follows quickly after the recent announcement that Blackburn trolleys are to be supplied to the R.A.F. for starting the main engines of the V-bombers (see picture, this page, February 13) and also the Folland Gnat. Since production started, some two years ago, orders have been placed for more than two hundred low-pressure Palouste gas turbines for starting equipment of all types.

John Bewsher Retires

A LIFETIME career in aircraft design closed at the end of last month when Mr. John Bewsher retired from the design-office managership of Vickers-Armstrongs (Aircraft) Ltd. at Weybridge. Since 1927, when he joined Vickers Aviation as senior draughtsman, he had been successively assistant chief draughtsman, chief draughtsman (experimental), drawing-office manager and design-office manager, responsible for administering all the design departments; but his career started in 1913 when he joined the Sopwith Aviation Co. as a junior draughtsman, and he is one of the few people who can claim to have designed a complete aeroplane by himself from start to finish.

At Sopwith he rose to be assistant to the chief designer and was concerned with all the famous Sopwith types of the First World War, specializing in the design of controls and main structures and in stressing. When the company closed in 1920 he was one of a small number of ex-Sopwith designers invited by the Japanese Government to initiate indigenous aircraft design in Japan under the ægis of the Mitsubishi company. He returned to England after some four years and joined the Air Navigation and Engineering Co. (A.N.E.C.) as an aircraft designer, later doing similar work on a free-lance basis. He designed the A.N.E.C. IV Missel Thrush and also the R.F.D. sailplane.

Last week we recorded new Board appointments by Electro-Hydraulics Ltd. and their associated company Conveyancer Fork Trucks Ltd. Here are the directors concerned: left to right, Messrs. A. Harold, R. Edwardes and T. C. Wright

R. A. Johnson

WE regret to learn of the death—in a road accident on February 22—of Mr. Reginald Arthur Johnson of CIBA (A.R.L.) Ltd. He was in charge of sales for the company's Bonded Structures Division and was well-known for a number of contributions, to technical journals, on Redux bonding and Aeroweb honeycomb core. Born at Coventry in 1915, Mr. Johnson served his apprenticeship with Sir W. G. Armstrong Whitworth Aircraft Ltd., was for a time with The Rover Co. Ltd. and went to the Duxford firm (at that time Aero Research Ltd.) in March 1949 to develop sales of their products in the aircraft industry. Mr. Johnson's wife was also killed in the accident and a 12-year-old son is left.

IN BRIEF

Arrangements have been made between the Pako Corporation and the Williamson Manufacturing Co. Ltd. whereby the American corporation will offer the Williamson photographic paper processor for sale, with parts and service programmes.

* * *

From J. Goulder & Sons Ltd., of Kirkheaton, Huddersfield, come details of their new bench-type machine for the quick and accurate measurement of lead in helical gears. The firm specialize in gear-checking equipment, including involute testers, lead measurers, master gears and a full range of rolling gear-testers.

* * *

A light and simple hand-held address amplifier known as the "Minihailer" (Aeronautical Trades & Mfg. Co. Ltd., 1 Wyndham Road, London, S.E.5) should have useful applications on airfields. This 3½ W 12 V amplifier has an internal microphone, a press-to-talk switch, and a volume control; weight is 17 oz.

* * *

Announcing their newest series of rectangular-chassis connectors for use with racked equipment, the Aircraft Components and Connector Division of Thorn Electrical Industries Ltd. (Great Cambridge Road, Enfield, Mddx.) state that these fittings (which can be pressurized) are resistant to vibration, shock and corrosion and will operate in a temperature range from −40 deg C to +100 deg C.

* * *

Light-weight seating designed and styled by de Havilland for first-class accommodation in the Comet 4s for Aerolineas Argentinas has been built by Lancefield Aircraft Components Ltd. The company, which has previously made seats for D.H. aircraft, has also done much work in waveguide manipulation, prototypes for radar development, and the production of such sheet-metal assemblies as manifolds and tanks.

* * *

A new company, Atton Developments (Woking) Ltd., has been formed with offices at 49/50 Maybury Road, Woking (telephone Woking 4928), and with the production of technical publications and publicity for small engineering firms employing up to three or four hundred men as its main object. Its directors are Mr. A. M. Atton, A.M.I.E.E.—until recently chief engineer of S. Davall & Sons Ltd. and formerly with Vickers-Armstrongs (Aircraft) Ltd.—and Mr. H. M. Atton, B.Sc.

AIR TRANSPORT IN A UNITED EUROPE (continued from page 326)

Scandinavia belongs to The Six this co-operation has still been interpreted in some quarters as the first effect of the Common Market upon the air transport scene! In fact, of course, it was a sign of something very much more fundamental—the growing awareness that those trying to push through the thickening jungle of European air transport had best not travel alone.

Some months after the Swissair-S.A.S. agreement was signed the airlines of The Six—Air France, Alitalia, Deutsche Lufthansa, K.L.M. and Sabena—came together to discuss various forms of rationalization. These meetings, which will continue during the coming months, have concentrated on rationalization in the technical sense. Yet some imaginative commentators have seen in this the birth of a single airline to operate all European air services. The administrative problems of managing such a monster are frightful to contemplate.

Investment also offers an opportunity for co-operation. The E.E.C. and the E.C.S.C. have each established investment banks to make capital available in less favoured regions and for other projects unlikely to attract private capital. A similar system could well develop in the air transport industry.

As long as Europe's air transport system can avoid the heavy hand of bureaucracy, then any degree of rationalization must be viewed favourably, both by The Six and by The Eleven. Britain's policy, as a member of the second group, must be to follow a dual course: on the one hand, the British aviation industry must be encouraged to participate as fully as possible in air transport developments across the Channel; and on a broader plane, air traffic between Britain and the Continent should not suffer as a result of national economic policies that allow The Eleven to be boycotted by The Six.

J. C. S.

The picture at right shows the twin wheels at the moment of impact, with the usual puff of smoke from abraded tyre-rubber. Below is seen the whole rig, with the "cushioning" air reservoirs towards the left

Drop-testing the Argosy Undercarriage

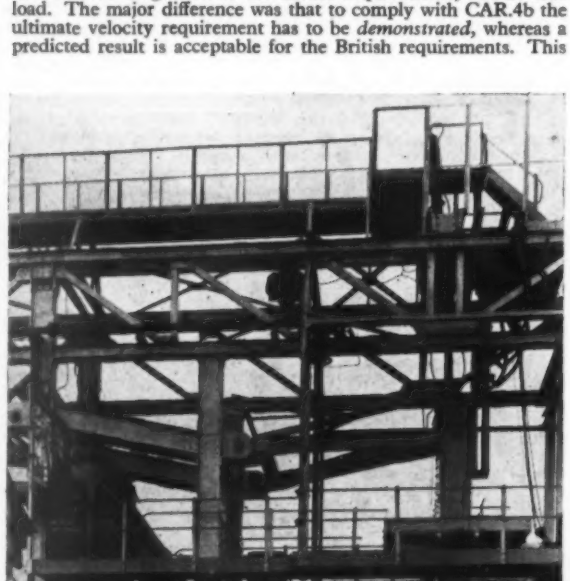
"AIRBORNE" LANDINGS ON THE DOWTY RIG

FEW experiences give the onlooker a greater respect for the designers of aircraft landing gear than the sight and sound of a main undercarriage unit slamming to the ground in a drop-test rig; and when the wheels are spun to make the test more representative of an actual touch-down the smell of burning rubber is added to the spectacle, earning admiration also for the makers of the tyres that stand up to such treatment in daily service.

Drop-testing is a spectacle only to visitors. It is routine to those in charge of the Dowty test rigs at Cheltenham, where we recently saw the twin-wheel main undercarriage of the AW.650 Argosy nearing the end of its tests. This particular undercarriage is of simple configuration, and is essentially a scaled-up version of that designed by Dowty for the Friendship. Accordingly, the number of drops made to verify the accuracy of the predicted performance, to meet American CAR.4b and British civil airworthiness requirements, was considerably less than the several hundred drops involved in testing complex bogie gears.

British requirements involved testing at a vertical velocity of 10.55ft/sec, with side and drag loads respectively ranging from zero to 0.25 and 0.40 of the vertical reaction. All tests had to be repeated to represent uneven ground, with tyres inflated differentially in the ratio 40 per cent to 60 per cent. Additional tests simulated one burst tyre at half vertical velocity.

Testing to the American requirements was done at 10ft/sec, with similar drag loads to the British requirements, but no side load. The major difference was that to comply with CAR.4b the ultimate velocity requirement has to be *demonstrated*, whereas a predicted result is acceptable for the British requirements. This kind of demonstration can be rather drastic and expensive, since, provided the gear does not collapse, it is permissible for it to suffer considerable permanent deformation.



The rig in which these tests were made is the largest of four, which together are capable of testing undercarriages for anything from a lightplane to aircraft of 400,000 lb gross weight. Of particular interest is the fact that the rigs now have "airborne" equipment, which simulates any desired wing or jet lift during the landing impact.

This equipment comprises vertical coupled pneumatic jacks, which connect with the falling mass just before the touch-down of the undercarriage and apply a substantially constant upward force which, in a fully airborne landing, is equal to the falling weight. This is done by having the jacks piped to a large volume, contained in two air bottles, so that there is little pressure-rise due to the jack stroke.

The jack pick-up mechanism comprises a trunnion which connects the two jack-rod ends and passes down through a long vertical slot in an attachment bolted to the falling mass. This forms a lost-motion arrangement, so that the falling mass can be allowed to fall freely and reach the required velocity before the jacks come into operation.

Announcement that the AW.660 version of the Argosy has been ordered for R.A.F. Transport Command has underlined the importance of such careful testing. The results achieved leave little doubt that the Dowty landing gear of this aircraft will stand up to whatever punishment it may receive, even during arduous tactical operations into forward airstrips.

LOOKING FOR OIL

AN oil exploration survey along the coast of Angola has recently been undertaken for Petrofina by Hunting Geophysics Ltd. The aircraft employed was a magnetometer-equipped DC-3 using Marconi Doppler AD.2000 to keep a running fix of its position. The extent of the survey was from the borders of French Equatorial Africa to just north of Porto Amboim. Over this coastal strip the DC-3 flew at 3,000ft (so that magnetic effects near the surface did not mask those of deep-lying rock structures), covering the area in a series of parallel traverses, totalling some 18,000 miles.

The team carrying out this work consisted of the flying crew, engineers, two electronics technicians and two geophysics technicians. A representative of Petrofina was present to ensure close liaison, and the geophysical records were inspected in the field to check that specifications were being followed. The expedition's first base was at Luanda; then with completion of the southern half of the coverage a move was made to Cabinda.

Another item of survey news is that Hunting Aerosurveys Ltd. have been awarded a contract for large-scale mapping of the municipality of Addis Ababa, capital of Ethiopia. The new maps (at scales of 1/2,000 and 1/4,000) are for re-planning purposes and the photography, from an aircraft flying at 5,000ft and 10,000ft, will cover over 200 square miles.

Correspondence

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. Names and addresses of writers, not for publication in detail, must in all cases accompany letters.

Altimeter Design

IT seems to me that, notwithstanding the desirability of having a minimum number of instruments, the present altimeter is being called upon to provide more information than one instrument reasonably can.

It is certainly difficult to feel enthusiastic about the interim design of instrument illustrated in your issue of February 13 (p. 233). Might not the best solution be to provide the pilot with a very rudimentary altimeter of a size and type comparable with the stand-by compass? This would be a simple and foolproof means of checking at a glance whether the aeroplane was 10,000ft away from the level at which the pilot assumed it to be—and surely this is the really important thing. I may be wrong, but I feel very strongly that if intelligent and experienced airline captains can be thousands of feet out in their reading of altitude at critical stages of flight the solution to this situation has to be a pretty fundamental one and is not going to be found in relatively minor modifications to the existing type of presentation.

Thames Ditton, Surrey. A. DAVIDSON.

YOUR news-item [February 20] on the Electra's altimeter and reference to the series of recent accidents to civil aircraft has focused attention on the possibility of the misinterpretation of altimeters during the approach to land. I find it very difficult to understand how experienced pilots having used similar types of instruments for years should make this sort of vital error.

During trials to measure the position-error caused by the position of the static vent, the altimeter of the war-time Typhoon fighter would, to my knowledge, indicate 600ft too high when flown at maximum speed near the ground. In your description of the Kollsman altimeter fitted to Electras it is clear that an attempt has been made to overcome some of the misinterpretations that a pressure-measuring instrument gives when it is used to indicate the height of an aeroplane. However, the fact remains that all these instruments measure pressure and not height.

All the aircraft concerned in these accidents have pressure cabins. As I imagine the cabin pressure is automatically equalized with atmospheric pressure about the time of landing, is it not possible that this might cause a false altimeter reading? I am not familiar with the detailed layout of these aircraft, but if the pipe from the static vent to the instruments concerned had a fracture on the internal side of the cabin wall, would not this cause a false reading? I think I am right in saying that if there was cabin pressure this would cause a low reading. On the other hand, a cabin depression, possibly due to the position of the main cabin ventilators, would give a high reading to the altimeter.

Kingswood, Surrey. D. R. ROBERTSON.

[Static systems are invariably duplicated, one serving each pilot's instruments. There may also be an emergency system taking ambient air pressure from within the aircraft (though not, of course, from within the pressure cabin). It is unlikely that a static-system leak which affected the altimeter would remain undetected, as other pressure instruments—the airspeed indicator and rate-of-climb indicator—would be affected as well.—Ed.]

Flight-deck Layout

IN *Flight* for February 20 Mr. H. T. Thompson made some proposals for improving the layout of flight decks so as to make the best use of different piloting abilities and the special abilities of a captain who is approaching his retiring age. I suggest that his proposal will neither suit present cockpits or operational practice nor those of the future.

The idea of having one pilot with only a basic set of instruments and controls with which safely to conduct take-offs and landings is fundamentally wrong. For one thing, a landing does not commence at the outer marker, but starts when the aircraft has to leave its cruising level on entering an approach zone. During this period of flight there must be no discontinuity of the principal means of command. Therefore, he needs also the means to control thrust, both positive and negative—which includes power and aerodynamic braking. Also the visual and aural indications of the A.T.C. system must be presented to him directly; in that connection a "non-piloting" captain can still listen-in and overrule any decisions before starting the final approach phases. Mr. Thompson's proposals seem to have divided the crew into very watertight duty compartments; as an example, No. 2 appears to be the only one concerned with communication and navigation functions.

Whether or not cross-monitoring of pilot actions is going to be needed it still does not alter the fact that the tandem layout of pilots' seats has not been found entirely satisfactory. It has some merit for lookout purposes, but that is about all. When it comes to economics—which is what sells aeroplanes and seats—the tandem layout becomes very expensive. One reason for this can be found if it is considered that there are three basic groups of man/machine servo loops which have to be continuously manned. In a layout where there are two pilots and a central pedestal, each pilot using his own set of information and controls may be described as two loops; and one pilot using his own instruments and controls *plus* those of the central panel, is the third loop.

The tandem layout which forms a part of Mr. Thompson's proposals will split the controls and information panels into more parts than can be easily handled even by three pilots.

Even with "black boxes" which allow selection of flight regimes by pressing buttons (marked, for example, Up, Down, Go, Stop, Left, Right) the proposed layout will be very wasteful of space. Of course, it is necessary to duplicate certain systems and groups of information and controls. However, at the same time it is acceptable to avoid extensive duplication by making some things readily accessible to two pilots at the same time. This, I suggest, is one of the fundamental merits of the present two-pilot arrangement. It not only economizes in controls and indicators; it also gives better communication in all senses between the two pilots.

The communicator/navigator/engineer position of the proposed layout is, I suggest, quite wrong. One man cannot do all those things and keep a lookout. It will be far better to put him somewhere else where he will have a logical arrangement of his information and controls and where he will not be disturbed by the pilots when changing positions. This introduces a general criticism by pilots—that they do not like to play musical chairs (or tables) on a flight deck. Therefore, position No. 3 should be moved elsewhere so that the No. 3 of Mr. Thompson's proposals can move back to the right-hand seat. We are then back where we started.

London, N.W.2. L. F. E. COOMBS.

Canadian Industry and the Arrow

THE Canadian Government's decision not to support financially the production of the CF-105 Avro Arrow has gravely threatened the Canadian aircraft industry.

In recent years thousands of highly trained and specialized aircraft personnel have left Canada for United States aircraft factories, due to production and seasonal lay-offs; many workers have lost possession of their homes on account of their inability to meet mortgage payments.

As a senior engineer I and many of my fellow-workers in the Canadian industry are waiting for the axe to fall. The Canadian Government's intentions to purchase American-made missiles, and its decision not to continue its financial support of research aircraft, will destroy what is left of the Canadian industry, for in these days of very high costs, especially in research, no industry can survive without government support.

Toronto. D. F. PATERSON.

[This letter was written shortly before the final decision to terminate Arrow development was announced on February 20.—Ed.]

FORTHCOMING EVENTS

Mar. 6. Helicopter Association: "The Place of the Helicopter in a Modern Army," by Lt-Col. P. W. Mead.
Mar. 7. Helicopter Association (Regional Lecture, at Yeovil): "Helicopter Activities in the Royal Navy," by Lt-Cdr. J. S. Sproule.
Mar. 7. British Interplanetary Society: "Radio Communications with a Space Probe," by Dr. W. T. Blackband.
Mar. 10. R.Ae.S.: "Water and Ice in the Atmosphere," by R. F. Jones.
Mar. 10-17. I.F.A.L.P.A.: Annual Conference, Helsinki.
Mar. 11. Kronfeld Club: "Navigation," by Lorne Welch.
Mar. 12. R.Ae.S.: 12th Louis Blériot Lecture, "The Nord Griffon; and Turbo-ramjet Power," by M. l'Ing. Gen. de l'Air Noël Daum.
Mar. 13. British Gliding Association Ball, London.
Mar. 13. Radar and Electronics Association (Student Section): "Radar Data Handling," by Dr. L. C. Payne.
Mar. 18. Aircraft Recognition Society: Film Show.
Mar. 18. Kronfeld Club: "Instrumentation and Cloud Flying," by David Ince.
June 12-21. Paris Aero Show.
Sept. 7-13. S.B.A.C. Display and Exhibition, Farnborough.

R.Ae.S. Branch Fixtures (to Mar. 13): Mar. 9, *Halton*, "The Trans-Antarctic Expedition," by S/L. J. Lewis. Mar. 10, *Boscombe Down*, film show; *Cambridge*, "Satellites," by —. Wilson. Mar. 11, *Bristol*, Barnwell Memorial Lecture, "Bristol Prototypes," by C. F. Uwins; *Chester*, "Bird Flight," by J. L. Pritchard; *Hatfield*, "Metallic Material for Supersonic Aircraft," by G. Meikle; *Manchester*, Chadwick Memorial Lecture, "Factors in Air Transport Economics," by N. E. Rowe; *Reading*, "An Introduction to Nuclear Power," by H. C. Stone; *Southampton*, "Aviation Medicine," by S/L. D. R. H. Urquhart; *Swindon*, "Development of the Aeroplane," by H. H. Gardner; *Weybridge*, "The Air Registration Board," by R. E. Hardingham.

SERVICE AVIATION

Royal Air Forces and Naval Flying News

Dam Busters' Standard

A STANDARD is to be presented by Queen Elizabeth the Queen Mother to No. 617 Sqn. at R.A.F. Scampton on Thursday, May 14.

Battle of Britain Week

THIS year's Battle of Britain Week will be held from September 14 to 20. Battle of Britain Day itself, commemorating the climax of the 1940 air battle, will be marked on September 15 by traditional ceremonies and colour-hoisting parades at R.A.F. units throughout the world; and the "at home" day—when stations are open to the public—will be on Saturday, September 19. The following day will be commemorated as Battle of Britain Sunday with the customary thanksgiving services in cathedrals and churches.

Week's Good Show

WHEN undercarriage failure occurred in a Victor due to land at R.A.F. Gaydon from a training sortie on the night of February 24/25, the pilot and co-pilot made a successful wheels-up landing after three of the crew had been ordered to bale out. The captain of the aircraft, which belonged to No. 232 O.C.U., was F/L. D. R. Bryan and his co-pilot F/L. K. L. Handscombe. The three crew members were F/L. J. Chaloner (navigator), F/L. J. Churchill (bomb-aimer) and P/O. B. S. Anderson (A.E.O.). They all came down safely.

The Victor was flown round for about three-quarters of an hour to use up fuel before coming in. No fire occurred, and neither the captain nor the co-pilot suffered injury.

Off to Salisbury

FOUR Canberra B.2s flown by Royal Rhodesian Air Force crews are due to leave R.A.F. Bassingbourn next Tuesday (March 10) for Salisbury, Southern Rhodesia. The aircraft will form the nucleus of two squadrons being established by the R.R.A.F. to operate Canberras in the high-level bombing rôle (see this page, December 26 last year), and crews have been training at No. 231 O.C.U. at Bassingbourn. It is planned that they will leave there at the rate of four a month until the new squadrons have been formed. At present no decision has been taken on the numbering of the two new squadrons by the R.R.A.F., which up to now operates four squadrons, including two of Vampires.

Malcolm Clubs Fund

WITH the object of "helping to ensure that Malcolm Clubs are able to continue to provide essential welfare services to the airman abroad and at home," a Malcolm Clubs Trust Fund has been set up. The trustees are Lord Attlee, Marshal of the R.A.F. Lord Tedder, the Dowager Lady Trenchard, Mr. G. de Freitas, M.P. for Lincoln, Mr. F. W. Farey-Jones, M.P. for Watford, and Mr. W. Lionel Fraser. Trust funds may be applied "for the benefit of Malcolm Clubs Ltd., so long as it is a charity, or for the R.A.F.A., so long as it is a charity, or for such other charitable trusts for the benefit of members and former members of the Forces as the trustees may decide." Contributions should be sent to the Manager, Martin's Bank Ltd., Curzon Street, London, W.1.

Army Pilots' Feat

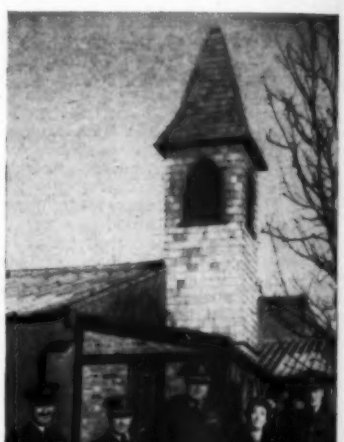
A RECORD total of 150,000 operational flying hours has recently been achieved by No. 656 Light Aircraft Squadron, Army Air Corps, in Malaya. Commanded by Lt-Col. B. B. Storey, R.A., and equipped with Austers the squadron has achieved this impressive tally in a wide variety of tasks. Its five flights—based at Noble Field, Kuala Lumpur (the headquarters base) and at Seremban, Ipoh, Taiping and Sembawang, Singapore—have between them carried out visual and contact reconnaissance; casualty evacuation; leaflet-dropping (over 150m since 1948); supply-dropping; target-marking; passenger-carrying; air shoots for R.A. and Naval guns; night illumination for ground troops; and communication and photographic sorties.

Some recent figures indicate the extent and persistence of these duties. Thus, over 80,000 sorties have been flown on visual reconnaissances alone and 7,800 on the reconnaissance of helicopter landing grounds and supply-dropping zones; more than 1,750 Communist terrorist camps have been located by the squadron's aircraft since the start of the emergency in Malaya; in the same period about 50,000 passengers have been carried and 400 tons of supplies dropped (in loads of 60-70 lb on the average, though up to 130 lb has been carried); and in addition to its 150,000 operational hr the squadron has flown over 40,000 hr on training, air tests, demonstrations and other non-operational tasks. During the ten years of the emergency its members have been awarded five M.B.E.s, 17 D.F.C.s, seven B.E.M.s and four D.F.M.s.

No. 656 Sqn. was originally formed at the end of 1942 at R.A.F. Westley, near Bury St. Edmunds; then after serving in India, Burma, Malaya and Java it was disbanded in 1947 except for one flight—which became 1914 A.O.P. Flight and is today the senior flight on the squadron. No. 656 re-formed in 1948 at the start of the Malayan emergency and ceased to be part of the R.A.F. when on September 1, 1957, the Army Air Corps was formed. The first flight to be added since the A.A.C. formation, 16 Reconnaissance Flight, brought the Squadron's total to five in September 1958.

C.F.E. Memorial

AT R.A.F. West Raynham last Wednesday week a belfry and steeple on the station church were dedicated by the Bishop of Thetford, the Rt. Rev. Martin Leonard. They have been erected (with money raised on the station) in memory of A. Cdre. G. D. Stephenson, a former Commandant of the Central Fighter Establishment at West Raynham, who was killed in a flying accident in Florida in 1954. The dedication ceremony was attended by his widow and family and by the A.O.C. No. 12 Group, A. V-M. J. R. A. Embling, and by the present Commandant, A. Cdre. Hughie Edwards, V.C.



After the dedication of the new belfry and steeple on the station church at West Raynham (see paragraph above), from left to right: W/C. R. B. Lord, station commander; A.V-M. J. R. A. Embling, A.O.C. No. 12 Group; A. Cdre. H. I. Edwards, Commandant, C.F.E.; Mrs. Colbeck-Welch; and A. Cdre. E. L. Colbeck-Welch, a former Commandant

The crew of the Shackleton MR.3 "C" for Charlie, No. 206 Sqn., after flying for 24 hr 21 min from R.A.F. St. Mawgan on a long-range exercise (see this page, last week). The captain, F/L. D. R. Foster, is second from the left on the front row; on his left is the Wing Commander Flying, W/C. G. Young

Refuelling extremes are illustrated by, at left, one of the two R.N. Whirlwinds (note flotation gear) from H.M.S. "Protector" after landing aviation spirit on the Argentine Islands: with the delivery are Mr. J. C. Farman, base leader, Falkland Islands Dependencies Survey (left), and Chief Air Artificer Davies. At right, Sabres of No. 77 Sqn., R.A.A.F., being refuelled at Guiuan in the Philippine Islands on their way to Butterworth in Malaya under the second phase of Operation Sabre Ferry

F.O.A.C. Promotion

HAVING been appointed Flag Officer Aircraft Carriers in January (as announced on this page, January 9), Rear Admiral C. L. G. Evans has now been promoted to Vice-Admiral. In his new post Vice-Admiral Evans, who is one of the most famous F.A.A. pilots of the Second World War, succeeded Vice-Admiral A. N. C. Bingley.

Air Officer, Wales

CEREMONIAL and social R.A.F. duties in Wales previously undertaken by the A.O.C. No. 64 Group are now being carried out (from March 1, St. David's Day) by the Officer Commanding R.A.F. St. Athan, who for this purpose will have the title of Air Officer, Wales. This change was announced last week.

The Officer Commanding at St. Athan is A. Cdre. V. D. Morshead, who in his new rôle will be responsible for co-ordinating all R.A.F. ceremonial and social activities in Wales and will also maintain relations with the Civil Departments and the other Services. No. 64 Group of R.A.F. Home Command is to disband on March 31 and its A.O.C., A.V-M. H. V. Satterly, is retiring from the Service.

Going Abroad

TWO senior postings have just been announced by the Air Ministry. A. Cdre. J. N. Tomes, who for the past two years has been serving with the Defence Research Policy Staff (Air) at the Ministry of Defence, is to be Air Attaché at Bonn from March 24; and G/C. T. E. J. Fitton, until recently Deputy Director of Technical Services, takes up the post of Senior Technical Staff Officer at the Far East Air Force on March 23 with the acting rank of air commodore.

A. Cdre. Tomes was Deputy Director of Bomber Operations before going to the Ministry of Defence, and during the war he commanded No. 57 Sqn. in Bomber Command. G/C. Fitton transferred from the flying to the technical branch in 1940, and one of his wartime posts was that of engineering officer of the handling squadron (then commanded by W/C. George Stainforth) at the C.F.S., where Pilots' Notes were written on new types.

Studying the NA.39

REPRESENTATIVES of the R.C.A.F. visited Brough recently to investigate the Blackburn NA.39 and have discussions with directors and senior executives of the company. Their visit followed one made to Canada by the chairman and managing director, Mr. Eric Turner, and the technical director, Mr. N. E. Rowe. The R.C.A.F. "team" was led by S/L. T. R. Futer, who was accompanied by S/L.s R. G. Christie, W. R. Cole and J. P. Dixie, F/L. R. A. Jackson, F/O. A. Silverman and Mr. A. Kielland of the Department of Defence Production. They were joined by W/C. A. F. Brown, S.A.S.O. at the Canadian Joint Staff in London.

Talks lasted for some days and covered the design, production, flying, costing and many other aspects of the NA.39. It was hoped that some members of the team (which included three test pilots) would be able to fly the aircraft, but they were prevented from doing so by bad weather. S/L. Futer, however, had a short flight from Holme-on-Spalding Moor in the observer's seat of an NA.39 piloted by Blackburn test pilot "Sailor" Parker.

Royal Flush IV

HOST operational centre this year for the fourth AIRCENT "Royal Flush" aerial reconnaissance competition—to be held from June 2 to 5—will be the Royal Netherlands Air Force NATO airbase at Eindhoven. British, Dutch and Belgian teams will represent 2nd A.T.A.F. and 4th A.T.A.F. will be represented by French and U.S. teams. Neither the R.C.A.F. nor the West German Air Force is participating, as the former has no reconnaissance aircraft assigned to NATO and the latter is not yet fully equipped. The RF-101 Voodoo is making its first appearance this year, in the low-level contest, in which a Swift and RF-84Fs are also participating. High-level competition will be between a Canberra of the R.A.F. and RB-66 of the U.S.A.F. The major award in "Royal Flush IV" is the Gruenther Trophy, which was commissioned in England in 1955 by Republic Aviation Corporation, one of the original sponsors of the AIRCENT reconnaissance competition. The trophy, which was last year presented by Gen. Alfred Gruenther in person, is at present held for the second consecutive year by 2nd A.T.A.F. (see *Flight* for October 3, 1958).

Recent Postings

AMONG recent Royal Air Force appointments announced by Air Ministry are the following:—

Air Ministry: W/C. B. Morgan, for duty in the Department of the Air Member for Personnel, March 2.

Fighter Command: Wing Commanders K. B. S. Willder to H.Q. as Group Captain Electronics (2), with acting rank of group captain; F. N. Brinsden to R.A.F. West Malling, to command the Administrative Wing; both March 2.

Technical Training Command: Wing Commanders K. E. Christensen to No. 2 School of Technical Training, Cosford, to command the Technical Wing; M. E. Claxton to No. 2 Radio School, Yatesbury, for education duties; A. W. Jones to the R.A.F. Technical College, Henlow, for accounts duties; C. E. P. Suttle to No. 1 Radio School, Locking, as S.E.O.; W. C. Vaughan to H.Q., for training duties; all March 2.

Maintenance Command: W/C. H. H. Mayoh to H.Q., as Command Education Officer, with acting rank of group captain; March 2.

Home Command: W/C. E. V. Masters to the R.A.F. Record Office, Gloucester, to command "B" Wing; March 2.

R.A.F. Germany (2nd T.A.F.): W/C. E. A. Grant to R.A.F. Laarbruch, to command the Administrative Wing; S/L. P. H. Cleaver to R.A.F. Jever, to command the Administrative Wing, with acting rank of wing commander; S/L. E. W. F. Hare to R.A.F. Geilenkirchen, to command the Administrative Wing, with acting rank of wing commander; all March 2.

Middle East Air Force: W/C. W. H. McCulloch to H.Q., for Provost duties; February 26.

Headquarters, British Forces Arabian Peninsula: S/L. J. J. Deverill as C.I.O., with acting rank of wing commander; January 16.

No. 582 Sqn. Reunion

COMMEMORATING the formation (on April 1, 1944) of **No. 582 Sqn.** in the Pathfinder Force a reunion of squadron members is being held on Saturday, April 4. Details may be had from Bill Lanning (44 Balmoral Avenue, Rushden, Northants), who also asks those who wish to receive the *Little Slaughter Gazette*—a news-sheet issued frequently—to contact him.

IN BRIEF

The Royal Ceylon Air Force will shortly become the first air force in the world to be equipped with armed Jet Provosts. It is expected to have these aircraft in service within the next two months.

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In a written Parliamentary reply last week the Air Minister said that it is proposed to send 18 aircraft to Lisbon next May for the British Trade Fair there (May 29 to June 14). Altogether 175 officers and airmen are likely to take part.

* * * * *

The 1958 Fighter Control and Radar Reporting Efficiency Trophy has been won by No. 3612 (County of Aberdeen) F.C.U., R.Aux.A.F., commanded by S/L. J. C. Robertson, as the most efficient F.C.U. in No. 13 Group of Fighter Command. Runners-up were No. 3502 (Ulster) F.C.U., Belfast.

* * * * *

The R.A.F. Benevolent Fund announced recently that £13,139 had so far been received from branches of the R.A.F.A. as a result of their 1958 Battle of Britain Week and associated activities. Donations are still coming in, and among the largest recently received are those from Jersey (£2,308) and Hong Kong (£1,800).

AIR COMMERCE

Differential Decision

IN Paris on February 26 agreement was finally reached by I.A.T.A. on the controversial issue of the jet v. propeller fare differential. A jet surcharge was agreed on North Atlantic jet services. Thus has I.A.T.A. survived its severest test to date. This article reviews the implications.

IN these pages nearly a year ago* it was suggested that a fare differential, *"as initially proposed, should amount to no more than, and probably less than, a 5 per cent fare reduction for propeller-driven transports on routes served by jets. It would be a class-for-class differential. . . ."*

This was but one of many contributions to one of the most difficult economic problems which air transport has encountered to date: Should there be a differential pricing of jet and propeller services?

So much has been written about the background to the controversy that repetition is unnecessary. Suffice it to say that I.A.T.A.'s proposal—subject to government approval—is for a fare differential on the North Atlantic of an amount varying between 4 and 6 per cent, class-for-class. The differential will not, however, take the form of a reduction on propeller services; it will be applied as a surcharge on jet services.

The new fare structure, to be valid from April 1, is as follows:—

(1) *All* basic North Atlantic air fares will be increased by $5 per one-way ticket per class, with $15 on de luxe.

(2) There will be a further jet surcharge of $15 on one-way economy-class and tourist-class tickets. This is equivalent to a surcharge of 5.8 per cent on economy-class, and 4.7 per cent on tourist-class, the new basic rates for these types of service being $257 and $320 respectively. Surprisingly, tourist-class service has not been abolished.

(3) There will be a jet surcharge of $20 on first-class jet services. This is equivalent to 4.5 per cent on first-class tickets, and 4 per cent on de-luxe class tickets. The new basic rates for these classes or services are, respectively, $440 and $500.

(4) Return jet surcharges will be double one-way.

(5) There will be jet surcharges both on first-class and on tourist-class fares to cover all international routes likely to be operated by jets during the ensuing months in the area comprising N. and S. America. The New York - Buenos Aires sector, for example (an announced Aerolineas Argentinas Comet 4 route, see pages 315 and 316), will bear a jet surcharge of $20, i.e., 3.6 to 4.3 per cent.

An Achievement for the System

Thus have I.A.T.A., contrary to so many forebodings, survived the "government intervention" and "rate-wars" which are always the threatened penalties (though never yet invoked) of failure to agree. To have withstood such a test—and to have agreed on something to which Pan American objected—is indeed an achievement for I.A.T.A.'s fare-fixing machinery. According to the chairman of the traffic conference, Mr. V. H. L. Dubourcq of K.L.M., both sides made "considerable concessions."

An unexpected decision was the proposal to raise all basic North Atlantic fare levels by $5 per ticket per class. It remains to be seen whether this meets with the approval of I.A.T.A.'s most dreaded bogy—the American Civil Aeronautics Board—whose general policy is to discourage the raising of international rates by U.S. airlines (and hence by other airlines operating into the U.S.A.) unless the increases are accompanied by complementary decreases in the lowest-rate services. I.A.T.A. did agree on "a wide variety of low-level creative and inclusive-tour fares"—but in Europe, and not on the Atlantic route.

Will the Civil Aeronautics Board agree to the proposed jet surcharge? The answer is almost certainly in the affirmative, despite the fact that the I.A.T.A. agreement only partially fulfils the pertinent C.A.B. "statement of policy." This was laid down last September just before the first I.A.T.A. discussions began, and it ran as follows:—

"The Board considers it inappropriate to resolve at this time the single question of whether or not a fare differential for jet services would be reasonable. It has been the general policy of the Board that fare differentials for particular aircraft types are inconsistent with sound rate-making principles. On the basis of the facts presently before us, the Board sees no reason to depart at this time from this policy.

"The Board considers it essential that jet services be integrated into the fare structure in such a manner as will permit their operation in any class of service. Jet equipment shows promise of being more economical than aircraft presently in service. It is particularly important, therefore, that opportunity to operate jets in the low fare service be protected. . . ."

But the C.A.B. itself has already accepted the principle of a fare differential in America; and—so far as the second part of the above statement is concerned—I.A.T.A. has met the C.A.B. requirement that jets shall be operated in the lowest-fare services.

How has the jet surcharge actually been working out in America?

The passenger load factor on Boeing 707 jet flights for the first 18 days' operation on the U.S. transcontinental route was 99.5 per cent. This was announced in the middle of last month by American Airlines, who introduced the 707 into daily non-stop service between New York and Los Angeles on January 25. The airline's vice-president, sales, Mr. Charles A. Rheinstrom, described results as "even beyond the airline's most optimistic expectations."

A load factor as high as 99.5 per cent over 18 days is an astonishing feat, reflecting as much credit on American Airlines' reservations system as on the appeal of their jet. And it suggests that the airline is turning away as many passengers as it actually flies (3,720 up to February 11). All this has been achieved despite a jet surcharge.

Before they introduced the Boeing 707, American Airlines asked the C.A.B. for permission to charge $10 extra on the price of each one-way ticket between New York and Los Angeles. The normal first-class fare on this route is $166.25, and the coach-class fare is $104.00. This means that A.A. sought a jet surcharge—taking into account their present seating configuration (68 first-class four-abreast, 38 coach-class six-abreast)—of 6.35 per cent. Surcharges on other sectors were also sought, namely $3 per ticket New York - Chicago, and $7 per ticket Chicago - San Francisco/Los Angeles.

At the same time National Airlines, following their 707 lease-agreement with Pan American, also sought surcharges on their New York - Miami routes. However, the economics of this request were rather different. They were also rather complicated, but well worth sorting out.

The 707 concerned would, of course, have exactly the same Pan American seating arrangement as used on the North Atlantic route—namely, 40 de-luxe class seats and 71 economy-class seats. What National sought was a $10 surcharge *on U.S. domestic first-class rates for a seat in the I.A.T.A. de-luxe class 707 cabin.* In addition, they sought to charge the normal U.S. domestic first-class fare for a seat in the economy-class cabin, a fare which is about the same in terms of cents per seat-mile as the I.A.T.A. economy fare (an interesting reflection, incidentally, on the difference between I.A.T.A. and American-domestic fare levels!).

National therefore wanted to charge extra for: (1) a class of accommodation not yet introduced in America—de-luxe; and (2) normal first-class fares for a seat (I.A.T.A. economy-class) below normal U.S. domestic first-class standard.

The C.A.B. granted provisional approval to all these surcharges, this approval being limited in the case of A.A. until July 31, 1959, and in the case of National until May 31, 1959.

Thus was the principle of a jet *versus* propeller fare differential first established. The fact that jet load factors have not been impaired as a result is indisputable. (National have been recording 90 per cent, which though less than A.A.'s is still remarkable.)

Jet Novelty and Scarcity

But jets are still a novelty both in America and on the Atlantic, and jet capacity will remain scarce, relative to propeller capacity, throughout 1959. The reason for the "provisional" nature of the C.A.B. and I.A.T.A. jet-surcharge approvals is simply that it will not be possible fully to analyse the effect of surcharges until jets and propellers have been operating side by side for at least a year. At the moment the jet surcharge is a charge for what the market will bear, and therefore as a short-term measure it makes sound economic sense.

As a long-term measure the fare differential makes economic sense, too. It does not matter how, or for what reasons, the fare differential has come about. It is now established, and fundamental decisions of this kind, agreed after heated controversy, have a habit of sticking. And if the principle of the fare-differential *does* stick, it may well be that (to quote *Flight* of Oct. 3, 1958):—

"[The fare differential] is the means by which the air transport industry can relax its obsession with 'quality competition.' . . . If the pace of re-equipment is not checked the airlines will be squeezed more and more tightly between heavy depreciation costs and the financing of new technical advances such as . . . supersonics. . . . Once a differential were established it would keep quality-competition in check, and would encourage technology to be devoted more to the production of cheap transport aircraft, uncompromised by performance."

These sort of arguments have hardly been voiced in I.A.T.A. The differential has come into being due to the sour demands of airlines without jets—the "have-nots." But these airlines have established—albeit with a wrong argument—a right principle.

J. M. R.

(A note on the implications for B.E.A. and B.O.A.C. appears on the next page.)

**Flight, April 18, 1958: "The Case For The Fare Differential," p. 521.*

AIR COMMERCE . . .

CORPORATIONS AND THE DIFFERENTIAL

LAST week B.O.A.C. said that they "welcomed" the I.A.T.A. jet surcharge agreement (page 332). As B.O.A.C. have been unwaveringly anti-surcharge, the welcome was presumably extended to the agreement as such rather than to the object of the agreement. In fact, however, the Corporation may profit from the surcharge: transatlantic Comet 4 services—which are all first-class and de luxe—should easily be able to bear the extra £7-odd without adverse affect on load factor, though this situation will only hold good while B.O.A.C.'s transatlantic jet seats are in short supply. On B.O.A.C.'s *major* Comet 4 routes (eastern and southern) no surcharge will of course be applied.

B.E.A., being pro-differential, must also have welcomed the acceptance—albeit not yet on European routes—of the principle which was advocated in their last annual report. It remains to be seen how B.E.A.'s share of the traffic will be affected by S.A.S. and Air France Caravelles as from May 15. B.E.A.'s greatest concern at the I.A.T.A. conference was to get agreement on cut-rate inclusive tours (*Flight*, Nov. 7 and 21). In this they succeeded, and their summer business—which they have been booking regardless—will benefit considerably as a result.

ALTIMETER ACCIDENT—

MISREADING of an altimeter was the cause of the B.O.A.C. Britannia accident in fog at Winkton, near Bournemouth, on Christmas Eve. This was the view of the coroner, Mr. D. H. B. Harfield, in summing-up at the resumed inquest last week on the nine occupants who lost their lives.

The aircraft was on a test flight from London Airport with 12 people—crew-members and technicians—on board. The nine killed included the captain (Capt. John Jackson) but the first officer, Mr. Keith Myers, survived.

During the cross-examination the latter said that he did not think that either he or the captain had misread their altimeters. After the first part of the test was completed they received permission to descend from their height of 13,000ft over Hurn to 3,000ft to start another test; below was what they thought was cloud and haze, but was in fact the ground and fog. The two altimeters were not compared when the descent was started; and the cross-check which was to be made at 10,000ft never took place because "by that time we were in a field at Winkton."

Asked by the coroner "Would I be right in assuming that when you found you were to all intents and purposes on the ground, and you thought you were at 3,000ft, you must have misread the altimeter?" F/O. Myers said that neither he nor the captain had thought they were at 3,000ft at all; they thought they were at 10,000ft; neither, he insisted, had misread his altimeter.

An M.T.C.A. investigating officer, Mr. David Cuthbertson, gave evidence that the captain's altimeter was found on investigation to be in working order.

—AND ALTIMETER POLICY

AS we noted last week, September 30 is the M.T.C.A.'s deadline for replacement of existing three-pointer altimeters in all British civil aircraft which operate above 20,000ft. (A picture on p. 301 last week illustrated the new presentation.)

In the Commons on February 26 the Minister announced the appointment of an M.T.C.A. committee—on which all interests will be represented—to investigate the whole altimeter-interpretation problem.

Meanwhile, a Flight Safety Warning is being issued about the risk of mis-reading three-pointer instruments—which (says the Ministry) is "most likely when the routine monitoring of the instrument panel has been interrupted. If this happens during climb or descent the height when the instruments are rescanned may be very different from that anticipated."

This dish and tankard with attractively (and accurately) drawn illustrations of B.O.A.C. airliners are from a new series available in the shops or from the makers, Wade Heath & Co. Ltd., Burslem, Stoke-on-Trent. The range includes the Britannia, Comet 4, 707, and DC-7C. Leading particulars of each type are also given

707 TRAINING INCIDENT

A PAN AMERICAN Boeing 707, on a training flight from Paris Orly on February 25, shed its starboard outer engine pod and pylon during a demonstration of simulated engine failure. The incident occurred at a height of about 8,000ft and the pod fell into a field south-east of Cherbourg. On board were four PanAm pilots and a F.A.A. safety adviser.

An instructor, Capt. John Ryan, was demonstrating the effect on the aircraft of an engine cut at full (wet) take-off power—simulated by closing down both engines on one side from cruise power—and minimum control speed in this condition. This speed is governed by aircraft weight, and was about 115-120 kt in the case of the aircraft in question; the 707 took off at about 200,000 lb and probably weighed 180,000 lb at the time of the incident. The speed was apparently allowed to drop below the minimum at which lateral control (within a limit of 5 deg bank in either direction) could be maintained. The aircraft sharply dropped its starboard wing, starting a spin to the right under asymmetric power, and the starboard outer engine flew off outwards, carrying with it the pod and the mounting pylon.

The engine instruments, apparently, gave the first indication to the crew that an untoward incident had occurred; it was not immediately obvious that an entire pod was missing. The spin was corrected without difficulty after a loss of height of 3,000ft, and the aircraft was flown to London Airport (where PanAm have better maintenance facilities than at Paris) on the port engines. Subsequently the aircraft was inspected by a team of engineers from Renton, and by F.A.A. and C.A.B. representatives.

The aircraft is repairable, and the work will be undertaken at London Airport. The damage is said by Boeing engineers to conform closely to the results of the static test to destruction of a pod under side-load; although the pylon incorporates "structural fuses" designed to fracture in a belly landing, these are designed to shear under drag loads and did not fail. Apart from local breakages at the pylon attachment (the pods are slung from heavy ribs located diagonally to the inter-spar ribs and from a forging on the front spar) and to the lower skin, the wing is undamaged. Fuel was lost from the starboard wing because the cables to the fuel cut-off valve were strained.

It is not yet known whether any major modification will result from this incident; PanAm's Boeing 707s are continuing normal operations. A full stall under asymmetric power has previously been considered by Boeing to be such an unlikely flight condition that it has apparently not been investigated during test flying.

The Boeing 707 was again in the news last week when by accident one aircraft was found at New York to be mildly radioactive. The level was "less than one" on the Roentgen scale.

The aircraft involved was the one which near Gander had dived from 35,000ft to 6,000ft following autopilot malfunctioning. The exact sequence of events during the latter incident is still not definitely known, but it seems to have been established that the autopilot tripped-out when it was holding (possibly on the height lock) an out-of-trim condition.

A new DC-3 competitor between Puerto Rico and the Virgin Islands is this Rodriguez hydrofoil. Built in Italy (where similar craft have operated to Sicily since 1956), it is owned by Calderone Enterprises. Studies by Viemeister Associates, of Lindenhurst, New York, suggest that a developed 40-seat boat operated on such a route at 2,000 hr per annum, compared with a DC-3 at 1,500 hr, could break even at a fare 26 per cent below the air fare

"Flight" photograph
The two privately operated Britannia 300-series referred to in col. 1 are seen here: left, the British and Commonwealth 317 at Bombay, below, Air Charter's 307 at Stansted after its round-the-world flight

AIR COMMERCE . . .

PRIVATE ENTERPRISE BRITANNIAS

THE two pictures on this page are heartening in as much as they show the biggest products of the British aircraft industry in the markings of independent airline operators. The Bristol Britannias concerned are two of the three now in private enterprise hands: one (a 307) is operated by Air Charter, and two 317s are operated by Hunting-Clan on behalf of British and Commonwealth Shipping, whose name the aircraft bears.

The Air Charter Britannia had, when the picture was taken, just returned from a round-the-world flight carried out in the course of a Government trooping contract. The aircraft left Stansted on Thursday, February 5, carrying 100 Service personnel to Adelaide and Sydney. It arrived in Australia on February 8, whence it flew to Christmas Island where 112 new passengers were taken aboard and flown back to England by way of San Francisco and Montreal. Total flying time was 72½ hr.

The British and Commonwealth Britannia 317 was caught by *Flight's* camera at Bombay early last month while in the course of its first commercial flight. Ships' crews of five different nationalities—a total of 170 men—were carried between this country and India, from Germany to Japan, and from Hong Kong back to England. During the ten days that the Britannia was away, January 31 to February 9, it covered 20,000 miles in just over 60 hr. The British and Commonwealth Britannia had a Bristol team on board "to keep a watching brief and to offer any assistance should it have been needed." Representatives included a test pilot, radio officer, flight engineer and also aircraft and engine maintenance engineers.

NO GRANTS FOR MUNICIPAL AIRPORTS

A PROPOSED scheme of Government grants for municipal airports, suggested by the Aerodrome Owners' Association as an incentive for local authorities to take over aerodromes at present State-run at a loss, has been rejected by the Minister of Transport and Civil Aviation. This was announced at the annual dinner of the Association by Mr. John Hay, M.P., Joint Parliamentary Secretary to the Ministry. The Government was keen to encourage municipal ownership, Mr. Hay said, but the intention was to remove completely the financial loss on the airports concerned as soon as possible.

The chairman of the Association, Alderman V. J. Ross, reported that its present strength consisted of 42 ordinary members, 34 associate members and 38 affiliate members, and suggested that A.O.A. interests might be better served by a separate civil aviation ministry. Other speakers at the dinner were A. Cdre. Whitney W. Straight, Mr. T. J. Owen, Col. R. Mould-Graham and the Parliamentary Secretary to the Ministry of Supply, Mr. W. J. Taylor, M.P.

CIVIL BRITANNIC?

IN the House of Commons on February 23, the Minister of Supply, Mr. Aubrey Jones, was asked by Mr. Frank Beswick (Lab., Uxbridge) whether he could give the date by which it was estimated that a civilian version of the Short Britannic—the strategic freighter recently ordered for R.A.F. Transport Command—would be available.

Mr. Jones explained that the Britannic had been designed to meet both military and civil requirements and that the two versions would be closely similar. "Being designed to carry bulky and heavy loads over medium and long distances," he said, "the aircraft should prove exceptionally economical in operation and therefore of interest to civil operators." He went on to say that a civil version would be available at about the same time as the military type.

Mr. Beswick asked whether the Minister really thought that in four or five years' time the industry, including Shorts and its design team, would be more—or less—competitive as a result of producing the Britannic. Mr. Jones replied that the use of freighters was increasing by 20 per cent a year in the U.S.A. and it was desirable that Britain should enter the new market. The Britannic was the most ready aircraft. He could not say how many Britannic 3s had been ordered for the R.A.F.: negotiations were still proceeding.

Mr. Beswick asked the Minister whether he appreciated that the Britannic would have to compete with freighter versions of the 707; and did he think that the money involved placed our industry in a competitive position? Mr. Jones replied: "If the hon. member wishes to compare the Britannic with the 707 he will find that the ability of this aircraft to carry equipment is much greater."

THE TWIN-JET AIRLINER

THE cleverness of the French in creating the Caravelle becomes more evident day by day. Not only is that jet airliner soon (on May 15) to present the rivals of Air France and S.A.S. with a resounding competitive challenge, but the design formula also—twin jets and light weight (*circa* 100,000 lb)—is receiving the sincerest form of flattery.

In America, according to *American Aviation*, Douglas have recently scaled down the long-projected DC-9 (*Flight*, January 18, 1957, p. 81) from 125,000 lb to around 85,000 lb to 95,000 lb. And, more significantly, the Santa Monica projects team still appears to be wedded to the P. & W. J52—the engine which has always been the Douglas-preferred candidate for their "scaled-down DC-8." And now, of course, a fan version of this engine is available: there are no figures for it yet, but power must be of the order of 12,000 lb, and no doubt the fan confers an improvement on original J52 consumption comparable with that conferred upon the J57—namely about 10 per cent "leaner."

Two of these engines would make a perfect match for a less-than-100,000 lb, 80-passenger DC-9. The American report suggests that the weight and capacity of the Boeing 727—likewise long-projected—are of this order also.

It is this sort of jet airliner which Mr. B. S. Shenstone, chief engineer of B.E.A., recently referred to as the object of "average airline" thinking. His own company is, of course, firmly committed to the three-engined, 80/100-passenger Airco D.H.121, and will remain so. But the idea of a smaller twin-engined jet airliner to "fill in the lower-range gap" (as someone down Bristol way put it) has caught on since the 121 formula was settled, and particularly since the fan-craze started about six months ago.

The questions that now need asking—with some of the possible

THE FUTURE JET PATTERN?

Long-range (up to 4,000 n.m.)	Medium-range (up to 2,000 n.m.)	Short-range (up to 1,000 n.m.)
American:—		
DC-8	Convair 880/600	DC-9?
Boeing 707	Boeing 720	Boeing 727
British:—		
Vickers VC.10	Airco D.H.121	Bristol project?

answers—are: Is there a market for a smaller-than-the-121 jet airliner for the up-to-500-mile stages? It would appear that Douglas and Boeing think so.

Is a twin the right formula? There was never much passenger-resistance to the DC-3 or the Convairliners; nor is there likely to be to the Caravelle.

Is a jet or a turboprop the right formula? The promise of higher by-pass ratio turbojets—from Rolls-Royce, Bristol-Siddeley or Pratt & Whitney—and the predilection of passengers for jets (which is all that counts) make the short-range jet an economical proposition. A turboprop design could undoubtedly do the job more cheaply—and with a fare differential an aircraft like the Argosy would also make sound sense on the shorter ranges.

When would the airlines want such an aeroplane? Perhaps at about the same time as the 121 enters service—1963/64.

How much would it cost to design, develop, tool-up and produce? That is the $64,000—or rather the £10,000,000—question.

Meanwhile the French are building and putting into service an airliner which, though a "1950s" one in performance, is a 1960-80 airliner so far as the rightness of its formula is concerned.

AVRO 748 TO FLY IN FEBRUARY 1960

IN a recent message to Avro staff, Mr. J. A. R. Kay, general manager, said with reference to the Avro 748:

"The aeroplane must be in production and ready for the airlines by the second half of 1961. This means that the first aircraft must fly in February of next year. This is a pretty tight schedule but it can be done, and indeed has been done, by others.

"There must be no excuses this time next year; the 748 must be on the runway ready for take-off. . ."

Mr. L. J. Dunnett

M.T.C.A. APPOINTMENT

AS already briefly recorded, Mr. L. J. Dunnett, C.B., C.M.G., has been appointed Permanent Secretary to the Ministry of Transport and Civil Aviation in succession to Sir Gilmour Jenkins. He takes up his new post at the end of the month.

Mr. Dunnett, who is 45, entered the Air Ministry in 1936, transferring to the M.C.A. in 1945, to the M.o.S. in 1953, and to his present Ministry the M.T.C.A. last year.

MORE COMPETITION IN AMERICA

THE competitive position of Northwest Airlines has been improved in recent months to a remarkable degree: this is largely attributed to their entry into the bountiful south-eastern region. The C.A.B. is now considering applications for routes which could have equally dramatic effects on other American domestic trunk carriers. The investigation in question is the Southern Transcontinental Service Case, which covers the award of single-carrier routes linking California with Texas and Florida. Through services between these regions are at present only available through airline interchange agreements: Continental and American operate Houston - California, Delta and American operate Atlanta - California, while National, Delta and American collaborate to offer a through service from Miami to California.

Of the twelve domestic trunks only three—United, Northeast and Northwest—have not applied to move into this field. American and T.W.A. already operate extensive transcontinental networks and the former has already negotiated various aircraft interchange agreements to cover the routes to and from the south-east. American wish to operate Boeing 707s and Electras on a new route between San Francisco and Miami while T.W.A. seek an extension of their present network south-east from Albuquerque to Miami.

Another four applicants at present concentrate on the eastern seaboard but hope to expand to the Pacific: Eastern would like to open one new route Houston - San Francisco and two routes Miami - San Francisco; National already have rights between Miami, New Orleans and Houston, and would like to extend this network to California, at the same time broadening their coverage in the south-east; Capital have been steadily expanding from New England down to the Gulf of Mexico and now hope to put their Viscounts on to various routes stretching as far west as San Antonio, Texas; and Delta seek a two-way expansion, westwards from Houston and Fort Worth to California and eastwards from New Orleans to Miami.

Braniff already cover many of the sectors concerned but must fill a number of gaps—notably New Orleans - Dallas and New Orleans - Houston—before through services between the south-east and the Pacific can be offered. Another centrally situated carrier, Continental, already operate westwards to Las Vegas and El Paso from Dallas and Houston and would like to extend further to California. This carrier, unlike the others, has not applied to operate routes to the east of Houston. The final applicants, Western, at present operate no further east than Las Vegas and Phoenix and seek to extend these services as far as Houston.

If the Board continues its apparent policy of strengthening the smaller carriers wherever possible then Continental and Western would seem most likely to be awarded new routes. Neither of these airlines has, however, sought rights east of Houston. This problem could be conveniently overcome by filling the gaps in the Braniff network. But a solution along these lines would give little comfort to the two transcontinental applicants and to their four easterly neighbours.

FUNDS FOR K.L.M.

IN common with B.O.A.C. (see *Flight* last week), K.L.M. experienced a loss on last year's operations. Provisional figures reveal that the Dutch carrier suffered a trading loss in 1958 of Fl. 1.1m (£103,000) as against a profit of almost Fl. 22m in 1957. After adjustments to reserves, however, the airline shows a net profit last year of Fl. 13m.

This trading loss has come at a bad time for K.L.M., who are reported to be planning a public issue of shares within the next few months. This will take the form of 30-year convertible debentures amounting to some Fl. 65m (£6.1m), the shares to be issued in the Netherlands and the U.S. and to be quoted on the exchanges in Amsterdam and New York. The airline is also planning to increase the credit limit with three American banks —First National City Bank of New York, the Chase Manhattan Bank and the Bank of America National Trust and Savings Association—from $50m to $70m.

The share-issue and the increased bank credit will provide K.L.M. with additional capital to the tune of $38m. It is understood that this will be used to finance orders for new jet aircraft: at present the company's turbojet order-book includes only eight long range DC-8s and no medium-range aircraft.

Top picture shows the first U.A.L. DC-8, one of 22 JT3-powered versions on order. The rest of the 40-strong DC-8 fleet will have JT4s. Below it is the first of seven Boeing 707-120s for Qantas, due for delivery next month and for service in about six months' time

AIR COMMERCE . . .

LONDON'S PERMANENT HELIPORT

ROTORPORTS appear likely to be given long-term permission to establish a central helicopter station. At an inquiry held in London last week the London County Council withdrew their objections to the scheme put forward by Rotorports Ltd. (see *Flight*, February 20) although they expressed themselves as unable to accept responsibility for approving the project.

This responsibility has now been transferred to the Minister of Housing and Local Government. Bearing in mind the technical approval expressed by the M.T.C.A., and the implicit approval given by the local planning authorities, it is difficult to see the possible grounds for Ministerial objection. A decision is expected in late April or early May.

HONG KONG AGREEMENT

DETAILS are now available concerning the merger between Hong Kong's two local airlines (see *Flight*, January 2). In effect Cathay Pacific will take over Hong Kong Airways on about July 1.

Until then the present operational plan will continue more or less unchanged, with Hong Kong Airways' two Viscounts plying the routes leading north from the colony to Seoul, Tokyo and Taipei. Meanwhile C.P.A. will continue to operate their DC-4 and DC-6B (their DC-6 is being offered for sale) on the southern routes to Bangkok, Calcutta, Labuan, Manila, Rangoon, Saigon and Singapore. Cathay Pacific will receive their first Electra in April and the second aircraft will be accepted in July.

The name Cathay Pacific will be adopted by the combined organization, and the board will comprise the present C.P.A. directors together with a representative each from Jardine, Matheson and Co. and B.O.A.C. (the joint owners of Hong Kong Airways). Since January 31 all H.K.A.'s reservations and traffic handling have been managed by C.P.A.

HONG KONG DISAGREEMENT

THE Government of Ceylon is reported to be considering a reduction in B.O.A.C.'s rights at Colombo from the present level of four flights a week. This threat does not appear to be a result of indirect pressure being brought to bear on the Ceylon Government by the Dutch—K.L.M. is closely identified with Air Ceylon—but is rather a reflection on Britain's delay in awarding Hong Kong traffic rights to Air Ceylon.

The Ceylon Government maintains that authority was granted to B.O.A.C. last summer to operate a fourth Colombo service on condition that Air Ceylon be given permission to fly to Hong Kong. During the course of subsequent discussions between the two countries the British Government allegedly agreed to give a final decision on this matter before the year-end.

Air Ceylon is anxious to open a service to Hong Kong: a second eastbound route is needed if an economic fleet utilization rate is to be achieved. The airline's sole present route east of Colombo terminates at Singapore (see, however, the note in "Brevities" below).

BREVITIES

As *Flight* goes to press it is reported that Misrair, following the Anglo-Egyptian financial agreement, is likely to sign an order for de Havilland Comet 4s (see January 9 issue).

* * *

Negotiations are in an advanced stage between Watney Mann Ltd. and the Palace Hotel Ltd. of London to build a £½m, 185-bedroom circular-shaped hotel a mile from L.A.P.

* * *

Mac. Robertson Miller Airlines will progressively replace their three Doves with DC-3s, the company's managing director, Mr. C. N. Keinig, has announced.

* * *

As part of I.C.A.O.'s plan to improve North Atlantic radio communications, a new cable will be laid from Newfoundland to Scotland via Greenland and Iceland. The U.K. will pay half the cost of the U.K.-Iceland section.

* * *

Ceylon's Minister of Transport will lead a delegation to Peking this month to negotiate an air agreement between Communist China and Ceylon. Air Ceylon plan to operate a weekly L.1049G service to Canton via Bangkok.

* * *

Though B.E.A.'s flights average only 1½ hr each, and notwithstanding the fact that utilization is made difficult by the international and highly seasonal nature of the Corporation's operations, average daily utilization in 1958 was 5¾ hr for the Viscount 800s and 6¾ hr for the Viscount 701s.

* * *

A report that the British Government has lifted its noise-restrictions on the operation of Tu-104s into London Airport came last week from Mr. Grigoriy A. Erotzkiy, the London representative of Aeroflot. The story was later denied by the M.T.C.A. Mr. Erotzkiy said that the Soviet airline intends to open an office in London, and that it would like to introduce Tu-104Bs (100-seat capacity) on to the London - Moscow route in May.

S.A.S. have negotiated a $49m loan, with a group of American banks and insurance companies, to finance jet equipment.

* * *

The number of hours now flown by Fokker and Fairchild Friendships in scheduled service has surpassed 10,000 hr.

* * *

Los Angeles Department of Airports reports a net profit of $2,029,411 from the operation of Los Angeles International Airport and Van Nuys Airport during 1957-58.

* * *

Further negotiations between the British and Indian governments on the bilateral agreement have been postponed until discussions are completed between B.O.A.C. and Air-India. The Corporation's existing pool partner, Qantas, is being kept informed.

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Comets of all types have now logged 63,000 flying hours. Experience with current aircraft in R.A.F., R.C.A.F. and B.O.A.C. service and with development aircraft amounts to 29,200 hr. Of these, B.O.A.C.'s Comet 4s have accumulated about 3,500 hr.

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Handley Page are sending the Dart Herald on an "extensive" demonstration tour of India and other Asian countries, starting "shortly." S/L. H. G. Hazelden, chief test pilot, will be in command. It will be the first of several overseas tours.

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Aer Lingus and Silver City will begin their newly announced joint service between Dublin and Blackpool on May 15. There will be two services a week from May 15 to June 1 and four services a week from then until September 30. The operation will be in pool.

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Mobile Aircraft Company are attempting to salvage the Varig Super Constellation lost off the Dominican Republic coast in August 1957. Three previous attempts have been abandoned. Three divers are working under "extremely difficult conditions which have included shark attacks."

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The M.T.C.A.'s final closing date for *general* flying at Croydon Airport is May 1. The Minister is, however, prepared "as an exception and for a short period after that" to allow commercial firms with established bases at Croydon to continue operations provided he is satisfied that these firms are "doing all they can to find alternative accommodation." In any case operations will cease altogether not later than September 30.

The scene at Hatfield on February 27, when Aerolineas Argentinas accepted the first of six Comet 4s (see article on pages 315 and 316). Sir Aubrey Burke, managing director of D.H. Aircraft, handed the log book of LV-PLM—which had been ready some days ahead of the schedule—to Sr. Enrique Bermudez, technical director. The aircraft arrived in Buenos Aires via Dakar and Recife on March 2. The second Comet 4, seen in the picture, is completing its production flight-tests. Just after this picture was taken the Argentine Ambassador, H.E. Sr. Teodoro E. Hartung, flew in -PLM round southern England.

FLIGHT